REVIEW AND APPROVAL

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 2007

_____	_____	_____	_____
Refuge Manager	**Date**	**Refuge Supervisor Review**	**Date**

_____	_____
Regional Office Approval	**Date**

INTRODUCTION

Alligator River National Wildlife Refuge is approximately 152,000 acres in size and lies at the eastern end of a broad, flat and swampy peninsula in northeastern North Carolina. Most of the refuge is located in the mainland portion of Dare County, with some land reaching southward into Hyde County. The refuge supports 64 species of fish, 264 species of birds, 62 species of reptiles and amphibians and 41 species of mammals.

Alligator River National Wildlife Refuge was established on March 14, 1984, with an 118,000-acre land donation from Prudential Life Insurance Company in Dare and Tyrrell Counties. Eventually, the Tyrrell County land was transferred to Pocosin Lakes National Wildlife Refuge and additional land was acquired, some of which lay further south in Hyde County.

In 1988, the addition of 5,100 acres of farmland substantially increased opportunities for waterfowl management. Today, the farm units attract numerous tundra swans, pintails, mallards, widgeons, and a variety of other species. In combination with the 46,000-acre Dare County Bombing Range located near its center, the refuge represents approximately 200,000 acres of relatively undisturbed wetland habitat.

The vast expanse of undisturbed swamp forest and wetlands in the refuge contains many important wildlife and ecological resources. Since most of the Pamlico peninsula has been developed by clear-cutting, peat mining and agricultural conversion, the refuge stands as one of the last remaining, most remote and diverse swamplands in eastern North Carolina.

Principal natural communities in the refuge include freshwater and salt marshes, as well as pocosins and broad expanses of non-riverine swamp forests. Its isolation and undisturbed quality add to the value of its rich wildlife habitats. The Alligator River area is part of the northern range border for the American alligator, and it remains one of the last strongholds for the black bear in North Carolina and the mid-Atlantic coast. The refuge also provides habitat for the endangered red-cockaded woodpecker.

Alligator River NWR is the center for the Red Wolf Recovery Program. The wild population of red wolves currently numbers more than 100. They live in nearly 20 family units, distributed across 1.7 million acres, throughout five counties in eastern North Carolina.

The refuge offers a wide variety of programs and activities for public recreation, including hunting, fishing, paddling, wildlife observation and photography. The number of environmental education and interpretive programs is increasing each year, as Americans “discover” this treasure in eastern North Carolina.

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 2007

U. S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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A. HIGHLIGHTS

The Alligator River Comprehensive Conservation Plan FONSI signed. (Section D-1)

Refuge Volunteer Program tallied 20,123.9 hours with 150 volunteers. (Section E-4)

Robert Teagarden was named Refuge Volunteer of the Year. (Section E-4)

Refuge accomplished 16 prescribed fires for a total of 5,994 acres. (Section F-9)

Refuge staff attacked phragmites and alligator weed. (Section F-10)

Red wolf reintroduction reached its 20th year, with 31 pups born in the wild in 2007. (Section G-2)

The Red Wolf Recovery Program won the 2007 Association of Zoos and Aquariums Award. (Section G-2)

The Red Wolf Education and Health Care Facility construction completed. (Section G-2)

Tundra swan, pintails, and green-winged teal account for 85% of total waterfowl use. (Section G-3)

Paddling trail visitation in 2007 is up by approximately 25% over 2006. (Section H-4)

Red Wolf howling safaris continue to be popular. (Section H-6)

Laurel Bay unit open to small game hunting in February for third year. (Section H-8)

A new boardwalk was constructed for Creef Cut Trail and the parking lot at Upper Milltail was enlarged and a floating dock installed. (Section I-1)

B. CLIMATIC CONDITIONS

The year started at near-normal water levels for the refuges, however, total precipitation was significantly lower than normal for February-May, with a wet early summer followed by a very dry August-November. Although December saw a return to near-normal precipitation, the impact of an 18-inch rain deficit for the year carried over into 2008. This overall reduction of annual rainfall limited prescribed burning windows to a very brief period during the spring, and as the drought built up to the worst in recorded history in the fall, there was a burn ban in place throughout the latter part of the year. The Keetch Byrum Drought Index (KBDI) was the highest ever recorded at the Alligator River weather station, topping at nearly 700.

There was a total of 16 named storms for the 2007 hurricane season. Of these, only six became hurricanes, and only one impacted the refuges in eastern North Carolina. That hurricane event was tropical storm Gabrielle, with 50-mile-an-hour winds which blew through the area in September. On measure, the storm did not even bring significant amounts of rainfall, however, it did cause some beach erosion at Pea Island NWR.

Rainfall totals are as follows:

2007 Rainfall Totals by Month (inches)

January	5.1
February	2.4
March	3.2
April	4.0
May	3.2
June	9.5
July	4.9
August	1.4
September	2.2
October	0.2
November	1.3
December	5.0
Total	42.4

C. LAND ACQUISITION

1. Fee Title.

The refuge accepted title to the 90-acre Broad Creek Land Partners Tract on the refuge boundary in Hyde County. This tract is adjacent to the Gull Rock Game Lands owned by the NC Wildlife Resources Commission. Also in Hyde County, The Conservation Fund closed on the 80-acre Allen Ballance Tract. The refuge should receive title to this tract once The Conservation Fund is reimbursed by the Service in 2008. Both tracts are key acquisitions for the refuge and link various tracts of the refuge together, or to other large protected areas.

The Service Regional Realty Branch continues to negotiate with the US Army Corps of Engineers and the NC Department of Transportation (NC DOT) concerning deed reservations involving the transfer of the Mashoes Road (391 acres) and M L Daniels Oil Company (1.4 acres) properties to the refuge. These properties were purchased by NC DOT as mitigation for expansion of a 10-mile section of State Highway 64 near Manns Harbor, NC, and were to be transferred to the refuge upon completion of the project. Permits for the highway project were issued in 1999 and the project was completed shortly thereafter. However, NC DOT has yet to transfer the property to the refuge.

2. Easements

During late 2003, representatives from Dare County and a private consulting firm approached the refuge for input and requirements for a utility easement. The proposed easement called for the construction of sewage collection lines across refuge land, to facilitate a wastewater treatment plant to be built on the Dare County Bombing Range. The plant would serve the community of Stumpy Point. The parties were advised of the procedures required to obtain a right-of-way permit from the Fish & Wildlife Service, including NEPA, compatibility, Section 7 and the actual right-of-way permit. This project continued into 2004 and, because of various regulations at the state and federal level, the original plan was modified to locate the facility in an area with no direct impact on the refuge. During 2005, some discussions arose regarding permit requirements for a treated wastewater discharge line crossing the refuge. The discussions did not initiate any actions by the refuge. In 2006, the project was modified to allow the installation of a 2.5-inch low-pressure sewer collection main within an existing easement along the shoulder of US Highway 264. An existing right-of-way easement was modified to accommodate this use on the refuge. Due to issues not related to uses of refuge land, this project was relatively inactive during 2007.

3. Pre-Acquisition

FT Van Druten assisted Mackay Island NWR in July and August by completing a Level 1 Pre-acquisition Contaminants survey for the Roemer Tract. See Mackay Island ANR for details.

Alligator River NWR was approached about interest in the Carleno Tract, which meets the refuge just east of where the Alligator River Bridge meets the refuge, near the state boat ramp north of US 64. Work with this tract will continue in 2008.

FT Van Druten assisted Jackie Cumpton in the Regional Office with some research on the Barge Canal/Ballance Tract. The background research for the Level 1 was initiated in December. This 80-acre tract along the south end of the refuge is a pending acquisition. There were time-critical issues concerning this tract, so The Conservation Fund acquired it, while the Service acquired the funds to purchase. It should become part of the refuge in 2008.

D. PLANNING

1. Master Plan

The Alligator River Comprehensive Conservation Plan (CCP) was officially approved June 6, 2007 when the FONSI was signed. However, due to region-wide problems with wording in the compatibility determinations the completed document had still not been released by the end of 2007.

FT Van Druten assisted Pocosin Lakes, Mattamuskeet and Swanquarter NWR's with their CCP process by modifying maps, updating data and supplying figures created at the CCP office when it was in operation.

5. Research and Investigations

Black Bear & Red Wolf: A proposal designed to assess habitat use by the black bear and red wolf population along the US 64 highway corridor was completed and submitted to the NC Department of Transportation in December, 2006. This research will begin two years prior to the construction start for upgrading the current highway from two lanes to a four-lane system. Other than attending meetings to discuss the proposal, there was no progress on this proposal during 2007.

Climate Change - Effects of Sea Level Rise: RB Stewart continued coordination and planning sessions with The Nature Conservancy and the North Carolina Coastal Federation regarding a pilot project to increase habitat management options as an adaption to rising sea level.

Geological History: The Department of Geology at East Carolina University continued data collection from the refuge for the purpose of learning more about the geological history of the area and the use of data to develop predictive models of landscape changes as sea level rises.

Red Bay Mortality: - Sampling was conducted on the refuge in February with the assistance of the US Forest Service. Results indicated that mortality was not due to the fungus vectored by the Asian ambrosia beetle.

6. Other (GIS)

Development of the Geographical Information System (GIS) for Alligator River began in the mid-1990s. Since that time, the refuge has acquired and created data for all refuge programs and all of the nine refuges in eastern North Carolina. The refuge maintains approximately 3,450 GIS files and six sets of aerial photography. We maintain a data sharing agreement with Dare County. The majority of the GIS work is completed by FT Brian Van Druten, although there are six other employees that use GIS on a periodic basis.

Program highlights and accomplishments for 2007 include: the creation of maps for road maintenance and upcoming road improvement projects; creation of a data layer showing the flow of water through the Alligator River NWR's farm units; FT Van Druten's attendance at the NC

GIS conference in Winston-Salem, NC and the Regional GIS conference in Cookeville, TN (at which he was an instructor); creation of GIS files for aviation hazards in the Southern Area (see further down in this section for more information); updated near-refuge bear mortalities data layer; provision of maps to refuge and state law enforcement to assist in their operations; creation of data to support proposed prescribed burning on Cape Hatteras National Seashore and maps for prescribed burning operations on five northeastern North Carolina refuges; generation of metadata; collection of post-treatment data on invasive species control and map production; creation of data and maps for the Wildland-Urban Interface program; participation in the Southeast Region GIS committee; continued work on sets of fire planning maps for northeastern North Carolina refuges; provision of technical support to area GIS users; and production of maps for 2 Level 1 Pre-acquisition Contaminants Surveys.

FMO Crews, FF Waters, and FT Van Druten participated on a Federal inter-agency committee (USFWS, NPS, & USFS) to create a set of protocols for the Southern Area on creating Aviation Hazard Maps for flight safety in 2005. These protocols included style, size and necessary contents of the map while limiting other information that may clutter such an important map. Both the USFS and USFWS have adopted these as the mapping standards for their respective areas in the southeast. In 2006, the protocols, GIS data, example maps and associated documents were placed online by Kurt Snider of the Cookeville Ecological Services. Updated aerial hazard data for FY 07 for each state and territory in the Southern Area (US Forest Service definition) replaced the FY 06 data in 2007. This information and data is available for download for the entire Southeast Region/Southern Area at http://www.fws.gov/southeast/gis/av_hazards.html. Work on this will continue into 2008 as FT Van Druten obtains the raw aerial obstruction data from the FAA and creates GIS layers by state for distribution of FY08 data.

E. ADMINISTRATION

1. Personnel

Alligator River NWR Staff – 2007

NAME	POSITION	STATUS	EOD
1. Art Beyer*	Wildlife Biologist, GS-0486-11	PFT	12/02/90
2. Mike Bryant	Wildlife Refuge Manager, GS-0485-14	PFT	04/14/96
3. Ann Marie Chapman	Park Ranger (Interp.), GS-0025-09 (left)	PFT-left	12/01/02
4. Eric Craddock	Eng. Equip. Operator, WG-5716-10	PFT	02/21/93
5. Bruce Creef	Eng. Equip. Op. Supv., WS-5716-10	PFT	04/21/71
6. Tom Crews	Fire Mgmt. Officer, (Fire)GS-0460-12	PFT	01/22/95
7. Helen Czernik	Fire Program Assist. (Fire) GS-0303-05	PFT	12/18/06
8. Kris Fair	Fish and Wildlife Biologist, GS-0401-09	PFT	05/02/96
9. Buddy Fazio*	Wildlife Biologist, GS-0486-13	PFT	04/22/01
10. Steven Foster	Forestry Tech. (Fire) GS-0462-04	PFT	05/14/06
11. Bobby Govan	Eng. Equip. Op., WG-5716-09	PFT	09/03/93
12. Donnie Harris	Supvy. Forestry Tech., (Fire) GS-0462-08	PFT	01/11/96
13. Diane Hendry*	Outreach Specialist GS-1001-09	PFT	03/20/05
14. Scott Lanier	Wildlife Refuge Manager, GS-0485-13	PFT	02/19/06
15. Chris Lucash*	Wildlife Biologist, GS-0486-11	PFT	12/02/98
16. Ford Mauney*	Wildlife Biologist, GS-0486-09	PFT	05/15/05
17. Eric Meekins	Eng. Equip. Op., (Fire) WG-5716-09	PFT	10/25/93
18. Amy Midgett	Eng. Equip. Op., (Fire) WG-5716-08	PFT	05/14/93
19. Mike Morse*	Wildlife Biologist, GS-0486-09	PFT	04/09/89
20. Ryan Nordsven*	Biological Science Tech., GS-0404-06 Term	TERM	08/07/06
21. Jonathan Powers	Maint. Mechanic WG-4749-09	PFT	04/24/88
22. Joe Sharbaugh	Forestry Technician (Fire), GS-0462-04 (left)	NTE 1yr-left	11/27/05
23. Frank Simms	Park Ranger (LE), GS-0025-09	PFT	10/29/05
24. Dennis Stewart	Wildlife Biologist, GS-0486-12	PFT	12/27/91
25. Bonnie Strawser	Supvy. Park Ranger (Interp.), GS-0025-12	PFT	12/31/80
26. Gregory Suszek	Prescribed Fire Specialist, (Fire)GS-0401-09	PFT	11/29/04
27. Jeffrey Swain	Eng. Equip. Op., (Fire) WG-5716-09	PFT	02/10/02
28. Brian Van Druten	Forestry Tech., GS-0462-07	PFT	01/15/99
29. Kelley Van Druten	Fire Mgmt.Officer (Fire) (WUI),GS-0401-11	PFT	02/16/01
30. Cory Waters	Forestry Tech. (Fire), GS-0462-06	PFT	11/30/03
31. Kathy Whidbee	Administrative Officer, GS-0341-09	PFT	06/03/01
32. Jim Wigginton	Refuge Manager, GS-0485-12 (left)	PFT	03/28/99

* Red Wolf Program employee

The following personnel actions occurred in 2007:

Administrative

Susan Ahlfeld resigned on 7/10/06.

Kathy Whidbee was promoted from program support assistant to administrative officer on 2/18/07 – also increasing her pay plan from GS-0303-07 to GS-0341-09.

Ann Marie Chapman resigned on 9/16/07 to take a position with NOAA.

Jim Wigginton transferred to Key Deer NWR on 3/18/07.

Left to right:
Back: Mike Bryant, Kris Fair, Kathy Whidbee, Bruce Creef, Bonnie Strawser, Jonathan Powers
Front: Dennis Stewart, Abbey Reibel, Brian Van Druten, Scott Lanier, Eric Craddock, Bobby Govan FWS

Maintenance

PFS Jonathan Powers was promoted from WG-4749-08 to WG-4749-09 on 10/28/07.

Fire

PFS Donnie Harris was promoted from forestry technician to supervisory forest technician on 01/30/07.

Joe Sharbaugh's NTE 1 year appointment expired 5/25/07. Joe has since taken a permanent firefighter position at Okeefenokee NWR.

Left to Right: Kelly Van Druten, Helen Czernik, Amy Midgett, Donnie Harris, Greg Suszek, Cory Waters, Eric Meekins, Steve Foster, Joe Sharbaugh, Jeff Swain. Front: Tom Crews. FWS

Red Wolf

OA Kathy Whidbee left the Red Wolf department to become the office administrator on 2/18/07.

TERM Ryan Nordsven was promoted from GS-0404-05 to GS-0404-06 on 09/02/07.
TERM Ryan Nordsven's term appointment was extended for another year.

Left to Right:
Back: Bud Fazio, Art Beyer, Ryan Nordsman, Michael Morse.
Front: Kathy Whidbee, Diane Hendry. FWS

Miscellaneous

PFS Kris Fair was promoted from GS-0401-07 to GS-0401-09 on 04/29/07.

Functional Titles

The following is a table defining functional title abbreviations as they appear in the Alligator River and Pea Island Annual Narrative Reports:

AA	Administrative Assistant
AFMO	Assistant Fire Management Officer
AO	Administrative Officer
DFMO	District Fire Management Officer
DRM	Deputy Refuge Manager
EEO	Engineering Equipment Operator
EEOS	Engineering Equipment Operator Supervisor
EO	Equipment Operator
FCO	Fire Control Officer
FF	Firefighter
FF/EO	Firefighter / Equipment Operator
FF/FT	Firefighter / Forestry Technician
FMO	Fire Management Officer
FMS	Fire Management Specialist
FPA	Fire Program Assistant
FT	Forestry Technician
MM	Maintenance Mechanic
MW	Maintenance Worker
OA	Office Assistant
OS	Outreach Specialist
PFS	Prescribed Fire Specialist
PL	Project Leader
RB	Refuge Biologist
RLEO	Refuge Law Enforcement Officer
RM	Refuge Manager
RV	Resident Volunteer
VSM	Visitor Services Manager
*VSS	Visitor Services Specialist
WB	Wildlife Biologist
WS	Wage-Grade Supervisor
WUIS	Wildland Urban Interface Specialist

*VSS Abbey Reibel – contracted position paid by CWRS.

4. Volunteer Program

In 2007, 20,123.9 hours of service were contributed to Alligator River NWR by 150 volunteers in the following areas:

Maintenance - 2,112.4 hours; wildlife/habitat- 6,915 hours; recreation-9,967 hours; other-1,129.5 hours. The hours were compiled from volunteers at both Alligator River and Pea Island National; Wildlife Refuges; both Refuges are therefore reflected in this section.

Interns, resident volunteers (RV's), local Refuge volunteers, and organized work groups are the four active groups which form the Refuge volunteer program.

Interns

College students and graduates seeking to gain experience in wildlife management, research and public use continued to turn to the refuges and the red wolf program for this knowledge. Interns were required to contribute a minimum of three months volunteer service, during which they received a $100-per-week food stipend and were furnished with free housing on the Refuge. All interns worked a 40-hour work week.

Name	Assignment	Time
Christie Sampson	Red Wolf Caretaker	January - May
Meghan Griffin	Red Wolf Caretaker	May - August
Joseph Hinton	Red Wolf Caretaker	August - November
Brett Idol	Fire Intern	March-December
Brian Kidd	General Refuge Intern/PI	August 06-March 07
Matt Spain	General Refuge Intern/PI	May-July
Bregan Hefflinger	General Refuge Intern/PI	May-July
Chip Kosloski	General Refuge Intern/PI	May-August
Josh Walter	General Refuge Intern/AR	May-August
Traci Foulkes	General Refuge Intern/PI	September-November
Lauren Spears	General Refuge Intern/PI	September-November
Joe Ibarra	General Refuge Intern/PI	September-November

Throughout the year, volunteer caretakers maintained the Sandy Ridge facility under the supervision of Chris Lucash, red wolf biologist. Caretaker duties include feeding wolves temporarily located in the pens, ground maintenance, assistance with red wolf howling safaris, supporting the work of red wolf wildlife biologists, and other duties as assigned. There were three caretakers at Sandy Ridge during the 2007 calendar year.

2007 Resident Volunteer (RV's)

Resident Volunteers, who were also scheduled in 3-month blocks, were provided a pod for their RV at Pea Island or Alligator River, and supplied with electricity, sewage disposal, washer/dryer, telephone hookup and internet. In exchange for the accommodations, the volunteers donated 24 hours per week per couple, or 32 hours per week per single. They provided refuges with routine maintenance, interpretive programs, canoe tours and visitor center operations.
The 2007 Resident Volunteers were:

Resident Volunteer	Award/hour pins	Work Area	Service
Rich Burke and Colleen Anderson	250 pin	Maintenance, VC, Public Use	Mar-May
Patsy and Ken Teiken	Certificate and 250 pin	Maintenance, VC, Public Use	Apr-June
Dave and Patty Kuyper	Certificate and 250 pin	Maintenance, VC, Public Use	June-August
Bill Voegtli	Certificate, 250 pin and 500 pin	Maintenance, VC, Public Use	April-June
Judy and Bill Monsma	Certificate	Maintenance, VC, Public Use	May-June
Judy Bell	Certificate and 250 pin	Maintenance, VC, Public Use	June-August
Judy and Albert Conley	Certificate	Maintenance, VC, Public Use	Nov-Dec

2007 Volunteer Awards

Cumulative hours tallied through September 30, 2007, yielded awards which were presented at the Annual Volunteer Awards Banquet in November. Awards were presented to interns and resident volunteers during the course of the year, since most were unavailable during the time of the banquet. Usually, interns reached the 500 hour "milestone" and received a certificate (100 hours), a volunteer pin (250 hours), and a volunteer pin with a 500 hour rocker. Resident volunteer awards varied. In addition, the following volunteers were presented "milestone" awards:

Certificate (100+hours)- Peggy Eubank, Elanit Fauth, Tommy Fulcher, Bill Monsma, Judy Monsma, Georgia Griffiths, Rich Griffiths, Waverly Reibel, Laura Wolke.

250 Hour Pin-Colleen Anderson, Sue Carroll, Angie Brady-Daniels, Ken Teiken, Patsy Teiken.

500 Hour Pin- Rich Burke, Traci Foulkes, Meghan Griffin, Joseph Ibarra, Brett Idol, Chip Kosloski, Kristy, Lauren Spears, Bill Voegtli, Ken Wynne, Josh Walters.

1000 Hour Pin- Joey Hinton, Ron Machand.

2500 Hour Pin- Stew Whittle, Pat Moore.

7000 Hour Pin- Warren Davis.

The Outstanding Volunteer for 2007 was Robert Teagarden, a huge asset with the turtle program on Pea Island National Wildlife Refuge.

Bob Teagarden (left) receiving Refuge Volunteer of the Year Plaque from Biologist Kris Fair (center) and Refuge Manager Mike Bryant (right) MHGM

John and Laura Gilson were recognized for their Highest Gross Sales at the Visitor Center in 2007 at Pea Island NWR.

Neither Alligator River nor Pea Island could sustain the current high level of interpretive programs, visitor support, or sea turtle monitoring without the consistent dedication of refuge volunteers.

5. Funding

Refuge funding for FY 07 was as follows:

FUND	NAME OF FUND	FY04	FY05	FY06	FY07
1113	Red Wolf	982.3	946.8	1243.3	886.5
1261	Operations	1355.7	1260.2	424.7	546.5
1262	Maintenance	422.5	107.0	665.7	523.7
1263	Public Use	N/A	N/A	343.0	317.3
1264	Law Enforcement	N/A	N/A	86.2	81.4
1281	Upper Milltail*****	N/A	N/A	N/A	10.0
29..	Storm Damage*	218.6	207.3****	104.4	N/A
9131	Fire Operations	1092.5**	710.1**	622.4**	509.7**
9263	Rx Burns	189.0**	205.7**	235.6**	125.9**
9264	WUI	286.0***	425.7**	401.2**	520.0**
9265	Rural Fire Assist.	37.2	35.0	62.1	N/A
TOTAL		**4583.8**	**3897.8**	**4188.6**	**3521.0**

*Storm damage money carries over, so the amounts include carryover from previous year.

**Includes last minute fund additions for fire equipment purchases.

***Includes $67.0 to pay settlement for legal action by a contractor.

****Approximately $67.0 of initial allocation was taken and reprogrammed by RO with no notice.

***** Upper Milltail Parking Lot Expansion and Floating Dock

6. Safety

Staff safety meetings were held monthly at the Manns Harbor Community Center. Safety Committee members were selected from the funded Program Areas (1260, 1113, 9131, 9264). The 2007 Safety Committee consisted of Ann Marie Chapman, Bruce Creef, Diane Hendry, Thomas Crews, Brian Van Druten, Kelley Van Druten, Greg Suszek, Steve Foster, Cory Waters and John Powers. Donnie Harris continued to serve as the station's Collateral Duty Safety Officer.

2007 Monthly Safety Topics included:

- Mowing Safety
- High Blood Pressure
- Tire Safety
- Staph Infections
- Fire Ants
- Blue Cross and Blue Shield
- Defensive Driving
- Spring Cleaning (Back Yard)
- Hurricane Preparedness
- Winter Hazards
- Chainsaw Safety

One ATV Safety Institute Ridercourse Class was taught at Alligator River NWR on April 25, 2007, by refuge instructor FT Van Druten. Two classes were taught at Pea Island NWR on May 23rd and 24th, 2007. A total of 11 students were taught in 2007. The classes included employees from two refuges, volunteers and interns, used mostly to assist with the Sea Turtle Nesting Program on Pea Island NWR. A total of 89 students have been instructed since 2004 at either Alligator River or Pea Island NWR's.

7. Technical Assistance

RB Stewart continued working with Dare County and North Carolina officials and the consulting firm, Wooten and Associates, to discuss a proposed sewer treatment facility for the Stumpy Point community. Currently, more than 60 homes have straight-pipe discharge of sewage into a canal adjacent to refuge lands that eventually dumps into Stumpy Point Bay. During 2004, Dare County made a decision to change the location of this project to an area with no direct impact on the refuge. Little additional information came forth in 2005 except that project proponents are discussing the possibility of a treated effluent discharge pipe traversing the refuge and discharging into the Lake Worth Canal. In 2006, Dare County and the Wooten Company concluded that the preferred alternative for the treatment plant would be to locate the facility on county property beside US Highway 264 and north of Bayview Drive. Treated water would be discharged into Bayview Drive Canal. A 2.5 inch sewer collection line will be installed within an existing right-of-way along the shoulder of US Highway 264 for a distance of 3,175, including an extension of the existing right-of-way by approximately 275 feet. There was little progress on this project during 2007.

During the course of the year, RB Stewart interacted with Mattamuskeet Ventures, Lux Farms, Tideland Electric, the N. C. Department of Transportation and Dare County with regard to various maintenance projects within rights-of way or requiring permitting by the refuge. Some, but not all, of these activities resulted in Special Use Permits being issued.

F. HABITAT MANAGEMENT

1. General

Generally, six categories of natural, vegetated habitat are found on ARNWR: brackish marsh, pocosin, mixed-hardwood pine forest, non-alluvial hardwood forest, cypress–gum forest and white cedar forest. Pocosin can be further divided into low shrub pocosin, high shrub pocosin, pond pine/shrub pocosin and pond pine/cane pocosin. These are classified as wetlands based on vegetation present, soil type and hydro-period. ARNWR contains some of the last remaining large tracts of pocosin-type habitat along the east coast. Although much of the refuge is relatively unaltered by humans, large portions have undergone changes in vegetation composition and hydrology caused by ditching and canal dredging for access and logging purposes. However, none of the wetlands have been drained by gravity to the extent that they would be classified as non-wetland. In more recent years, forested areas have been further fragmented with firebreaks to meet smoke management guidelines when conducting prescribed burns. The purchase of the Prudential farmlands in March of 1988 added agricultural land to the list of habitats. As the Comprehensive Conservation Plan developed, the six vegetative categories evolved into the twelve categories as shown in Table ***F-3-1.***

2. Wetlands

Many areas on the refuge have been impounded due to road construction for logging practices prior to the area's designation as a refuge. Problems associated with the artificially extended hydro-period have been partially resolved through installation of water control structures (WCS)

to facilitate water movement on both sides of the road. As usual, efforts were limited due to equipment and inclement weather. In 2007, a new WCS was installed under the Old Hwy 64 loop near the Creef Cut Trail to facilitate water movement in the canal supplying the Creef A1 Units. A WCS was also installed in the Sawyer Lake Rd canal across from Butler Rd. Some attention will be diverted to maintenance of existing structures.

Moist soil units were produced in prior converted farmland over a period of several years within the farm unit. In the 2006 growing season, which produced the food crop for the 2006-2007 wintering waterfowl season, most of the moist soil acreage was planted in corn, soy beans, millet, or winter wheat. Past experience has shown that fire and disking are the most efficient management tools for controlling undesirable vegetation and that planting some of the moist soil unit acreage with agricultural crops results in much higher waterfowl use. Also, it appears that intensive management practices are necessary on an annual basis to maintain the moist soil units in the most productive state.

3. Forests

Table ***F-3-1:*** Habitat types and approximate acreage of land within the boundaries of Alligator River National Wildlife Refuge.

Habitat Type	%	Approximate Acreage
Pond Pine / Shrub Pocosin	32.7%	50,012.5
Pond Pine / Cane Pocosin	2.8%	4,260.5
Brackish Marsh	7.8%	11,889.1
Low Shrub Pocosin	2.7%	4,194.5
Non-Alluvial Hardwood Forest	1.2%	1,800.0
Mixed Pine / Hardwood Forest*	14.0%	21,377.4
Atlantic White Cedar Forest	4.4%	6,700.3
High Shrub Pocosin	9.2%	14,127.4
Cropland	2.3%	3,468.5
Managed Wetlands	0.7%	1,001.2
Cypress-Gum Forest	4.9%	7,488.0
Freshwater Pools, Ponds and Creeks	1.5%	2,306.7
Administrative	1.0%	1,580.5
Bay Forest	0.9%	1,345.2
Shrub / Marsh Transition	4.5%	6,960.0
Mixed Hardwood Swamp**	7.5%	11,503.8
Loblolly Pine Forest	2.0%	3,001.5
TOTAL	100%	153,017.4

* Includes Mixed Forest.
** Cypress and Black Gum are not components of this habitat type.

4. Croplands

The 2006 Cropping Season saw a marked difference from previous years. Crop production increased, as well as the variety of food sources. All three (3) farmers were operating under individual Cooperative Farming Agreements (CFA). Current CFA's are valid through December 31, 2010. The long-term agreements allow the farmers to take advantage of the USDA's – Natural Resource Conservation Services (NRCS) CP-21 Filter Strip (393) Program. One thousand, six hundred and sixty six (1,666) acres of cropland were converted to filter (field drainage filtration) strips. When maintained in an early succession stage, the filter strips provide

beneficial habitat for a large diversity of wildlife species. Prescribed burning and seasonal mowing are used to maintain preferred habitat types. Addendums are used to compliment and support the current CFA's. The addendums are structured and approved on a yearly basis, depending on refuge management objectives.

During 2007 crop season, 473 acres of corn, 1231 acres of soybeans, and 195 acres of millet, as well as 273 acres of lespedeza, and 194 acres of wheat were planted. Corn production was good, yielding 117 bushels per acre. However, soybean yields dropped from last year's average of 35 bushels per acre to an average of 24.5 bushels per acre. Yields for millet and lespedeza were 300 and 420 pounds per acre, respectively.

During 2007 crop season, 473 acres of corn, 1231 acres of soybeans, and 195 acres of millet, as well as 273 acres of lespedeza, and 194 acres of wheat were planted. BC

Based on the 2007 Addendums to the long term CFA's, the refuge share (un-harvested) for all of the crops planted by the farmers was 222 acres of corn. This figure was determined by taking 10% of the total acres farmed for each farmer in corn, regardless of what crop the farmer may plant. Refuge staff also planted 126 acres of millet seed provided by cooperative farmer George Holmes in several refuge impoundments.

The 10% "equitable rent" is based on the requirement that the three cooperative farmers purchase all the fuel for the Laurel Bay and Creef Pump Stations. In 2007, the pumps ran for a total of 1884 hours, compared to 9,946 hours during 2006. Unlike 2006, heavy rains were not experienced during seed bed preparation, planting and growing season. Therefore, pumping requirements were not as extensive. The farmers purchased 4710 gallons of diesel fuel at a cost of $17,663 (using $3.75 per gallon as an average cost for diesel). Fuel prices steadily increased

during the year. Without the current CFA's in place, refuge water management objectives would not be achieved.

9. FIRE MANAGEMENT:

Alligator River continued to emphasize the district concept of fire management during 2007. District Fire Management Officer Tom Crews, focused on looking after fire management needs and issues on all nine eastern North Carolina refuges in USFWS Region 4, Fire Management District 1. Pocosin Lakes NWR FMO Vince Carver served as the District AFMO and training specialist, Carver is serving on the North Carolina Fire Environment Working Team and specializing in smoke management planning. FMO Carver also served as prescribed fire planner for Pocosin Lakes NWR, assisting DFMO Crews in writing prescribed fire plans. Wildland Urban Interface Specialist Kelley Van Druten spent much of her time planning needs within the District through Fire Program Analysis (FPA) and continuing her work with National Fire Plan initiatives such as rural fire assistance and community wildfire mitigation planning. Prescribed Fire Specialist Greg Suszek spent most of his time planning burns at Mackay Island, Currituck and Mattamuskeet Refuges, while DFMO Crews and FCO Donnie Harris updated burn plans for Alligator River and Pea Island Refuges. DFMO Crews is the primary prescribed fire planner in the District for all RXB1 and RXB2 prescriptions, but he uses the expertise of his staff to do most of the preparatory work.

Wildfire Preparedness:

Staffing Class Days for 2007
(RP – Readiness Plan or Staffing Class)

	RP 5 (Very High)	RP 4 (High)	RP 3 (Moderate)
Number of days:	2	66	58
Number of wildfires		19	7*

* These fires occurred on RP-3 days or lower.

Wildfires/acres:

NC Refuges in District 1 responded to 24 wildland fires across the district, totaling 6192.3 acres (FMIS records). The breakdown was: 5 fires at Pocosin Lakes NWR, 12 fires at ARNWR, 3 at Mackay Island NWR, one at Currituck NWR, one at Cedar Island NWR and two State assist fires near the refuges where FWS dispatched resources to assist. Two fires at ARNWR were escaped or converted prescribed burns. (This reflects the burning conditions during the prescribed fire season this year.) There were also eleven fires at Great Dismal Swamp. No wildfires were responded to on the Cape Hatteras National Seashore in 2007.
Beginning in October, 2007, the Refuges in NC were approved for a Wildland Fire Severity package. This allowed the refuges to increase the staffing levels at ARNWR and PLNWR and bring in a helicopter for the most severe fire weather days experienced. This package was renewed twice over a period of three months to go though January 17. The burn ban put in place by the North Carolina Department of Natural Resources had a very positive effect on reducing wildfire occurrence throughout the state. Had a wildfire occurred and escaped initial attack during this period, it would have been extremely difficult to control because of the soil dryness.

It would likely have burned for weeks or even months in the organic soils, possibly causing landform changes to occur, as was experienced during past fires burning during drought conditions.

The following table lists the wildfires that refuge staff assisted in or responded to across the District in 2007.

Wildfires in NC Fire District 1, 2007

Refuge	Fire Name	Start Date	Acres	Fire Number
MCR	Causeway 1	1/27/2007	0.1	C9HY
MCR	Causeway 2	1/27/2007	1	C9HZ
ALR	Stumpy Road Side	2/18/2007	2	C9Q6
CDR	USMC Indian Creek	2/23/2007	4124	C9Q7
ALR	S. Koehring Slopover	3/13/2007	886	DAJ1
MCR	Indian Creek Fire	3/14/2007	60	DAL9
ALR	Shooting Range Fire	3/25/2007	2	DA7G
ALR	ER Daniels Fire	3/28/2007	35	DBA6
ALR	Little Field Fire	3/29/2007	325	DBD6
CRR	Carova Beach Fire	3/20/2007	4	DA82
POR	Town Fire	4/9/2007	0.1	DB1A
POR	Old Pile	4/5/2007	0.1	DB09
POR	Super K	4/9/2007	0.1	DB1M
ALR	ALR Bridge Fire	4/9/2007	0.1	DB3T
ALR	South Point Peter 1	4/21/2007	0.9	DDT2
ALR	South Point Peter 2	4/21/2007	0.9	DDT4
ALR	South Twiford Dike Fire	5/15/2007	1	DFK0
State Assist	Stag Road Fire	5/23/2007	584	DHC6
ALR	Preacher Man Fire	5/30/2007	1	DG2U
State Assist	Big Time Island Fire	6/1/2007	25	DG8R
POR	Davis Fire	6/21/2007	50	DJ4X
POR Assist	Tucker Fire	10/1/2007	70	D1BB
ALR Assist	Fire #1	10/17/2007	15	D1QB
ALR Assist	Magnolia Road Assist	10/23/2007	5	D1SP
		TOTAL ACRES	**6192.3**	

Dispatch Operations:

Wildfire suppression and prescribed fire operations for District 1 were coordinated out of the Fish and Wildlife Service Dispatch Center located at East Lake, NC. Helen Czernik from Kill Devil Hills, NC, was hired to fill the Dispatcher and Fire Program Administrative Assistant position and began work in December 2006. She began learning dispatch functions and several software programs, including Fire Management Information System (FMIS), Interagency Qualifications Certification System (IQCS), Resource Ordering and Status System (ROSS), and the Weather Information Management System (WIMS), as well as the payroll, purchasing and budget protocols and programs. As the year progressed, Czernik took on more and more responsibilities and quickly learned the programs and responsibilities.

Dispatched assignments: During the FY-07 year, District personnel were dispatched to over 20 different states for a total of 642 days. This included two of the largest fires ever recorded in the United States. A Type 6 wildland fire engine from Alligator River was sent to the western United States and used on fires from New Mexico to Washington State, and Idaho.

Fire Organization:

District 1 Fire Management Organization has been reviewed and revised and sent to the Region for approval in October. No word was received on the requests at year's end.

Medical Qualifications:

The refuge implemented the new Interagency Medical Qualification Standards for arduous wildland firefighters this year. Beginning in December 2006, the refuge's 14 arduous firefighters took their Baseline physical exams. By the end of April, 11 firefighters were cleared to take the arduous Work Capacity Test and 3 were cleared with restrictions. There were several delays with the clearance process between individuals required to gather additional information on health conditions to submit to Comprehensive Health Services, and processing the waiver paperwork. In an attempt to avoid delays this year, all the firefighters took their Annual exams in November and December. Everyone was cleared.

Communications:

New Bendix-King hand-held radios were purchased and received for firefighters in Region 4. ARNWR received 10 radios.

Firefighters setting up hose and sprinklers to pump water onto pockets of burning peat on the Little Fields Wildfire CW

Hazardous Fuels Mitigation:

Prescribed Fire Planning:

PFS Suszek assisted Alligator River, Pea Island, Mackay Island, Currituck, Mattamuskeet, Cedar Island and Swanquarter Refuges in updating or writing new prescribed fire plans. All Fire Management Staff with Rx burn qualifications, including Harris, Suszek, K. Van Druten, Crews, Waters and Meekins wrote updated prescribed burn plans. Over 70 burn units were prepared for implementation on eight different refuges. Burning was coordinated at the district level, with Cedar Island and Pocosin Lakes Refuges taking precedent. Refuge managers once again met with fire staff to help establish the year's priorities for prescribed burning.

Hazardous Fuels Projects:

There were 41 prescribed burn projects completed in CY-07, totaling 15,913 acres (NFPORS records). The most significant of these were those completed in pocosin fuels at Pocosin Lakes and Alligator River NWR. Alligator River fire personnel worked with Pocosin Lakes and District 1 personnel, including firefighters from Mackay and Mattamuskeet. Many of these projects were very difficult burns in heavy shrub and timber fuels, some in units that had never burned under controlled conditions. In order to accomplish these burns, we had to extend our burning season into the normal spring fire season, as the first part of the year had been too wet.

Aerial view of the The South Koehring slopover in March of 2007
FWS

The notorious "Triangle Unit" at Pocosin Lakes was successfully and safely burned for the first time since the previous attempt in 1992, which resulted in a six-week-long wildfire. The Quadrangle Unit at ARNWR was completed in its entirety for the first time since attempts in 1999. The South Koehring prescribed burn escaped, causing a wildfire which was caught and brought under control. The burnout was completed by the next day, with an extra 170 acres of flooded pocosin burned out in the adjacent unit. The Little Fields burn had to be converted to a wildfire as a result of ground fire entrenching and growing over a two-week period, during which we experienced drying conditions and strong winds. This wildfire was extremely difficult to suppress, as it was burning as deep as two feet in places. In addition, there were 14 burns totaling 970 acres at Cedar Island NWR. These were especially challenging due to heavy fuels, close proximity to houses and the logistics of traveling to this remote refuge, which is a 4-5 hour driving distance from the other refuges in NC.

Local residents enthusiastically supported FWS in the prescribed burning program at Cedar Island NWR. The Cedar Island Volunteer Fire Department credited the FWS prescribed burn program with fire prevention and cited it as the reason there was not a single wildfire alert during the year 2007.

Total 2007 Hazardous Fuels Projects Accomplished by Refuge

	PRESCRIBED BURNS		MECH/CHEM PROJECTS	
REFUGE NAME	# of TREATMENTS	ACRES	# of TREATMENTS	ACRES
Alligator River	16	5994	18	115
Pea Island	3	1171	0	0
Pocosin Lakes	3	970	9	481
Mackay Island	5	2160	5	5
Currituck	1	234	3	5
Cedar Island	13	5384	0	0
Mattamuskeet	0	0	1	10
TOTAL	**41**	**15913**	**36**	**616**

Prescribed Burns at Alligator River/ Pea Island NWRs 2007

PROJECT NAME	TOTAL ACRES	FIRE NUM
3.3.8 Creef Farm A FY07	21	9263-D860
4.2.4 South Koehring FY07	5	9263-D899
3.3.8 Creef Farm B FY07	350	9263-D906
3.3.3 Creef Farm FY07	345	9263-D955
3.3.6 Creef Farm FY07	340	9263-D956
3.3.8 Creef Farm C FY07	188	9263-D993
3.1.4 Laurel Bay Ag A FY07	30	9263-4114
3.1.4 Laurel Bay Ag B FY07	280	9263-4134
4.2.4 S. Koehring	769	9263-4156
2.1.1 Quadrangle	774	9264-4188
2.1.5 Quadrangle	544	9264-4199
4.3.7 Little Field	313	9263-4200
4.3.8 Little Field	325	9263-4201
2.1.2 Quadrangle	928	9264-4209
2.1.3 Quadrangle	342	9264-4210
2.1.4 Quadrangle	440	9264-4211
Total for ALR	**5994**	
8.1.1 N Pea Island FY07	790	9263-D916
8.1.2 N Pea Island FY07	210	9263-4346
8.1.4 S Pea Island FY07	171	9263-4347
Total for PLR	**1171**	

Mechanical Fuel Projects (9264) at Alligator River NWR 2007

PROJECT NAME	COMPLETION DATE	ACRES
(Mech) Access Crossings (6)	1/23/2007	2
N. Stumpy Pt. B Firebreak FY07	7/20/2007	9
South Pt. Peter Firebreak FY07	7/24/2007	6
N. Stumpy Pt. A Firebreak FY07-2	8/3/2007	34
Wolf Cabin Defensible Space FY07	8/22/2007	1
Wolf Pen Firebreak FY07	8/22/2007	2
Ed Sawyer Firebreak FY07	8/29/2007	10
Long Curve to 264 Firebreak FY07	9/5/2007	5
East of Borrow Pit Firebreak FY08	10/10/2007	7
Lake Worth South Firebreak FY08	10/10/2007	1
West Point Peter Firebreak FY08	10/12/2007	6
S. Stumpy Point Firebreak FY08	11/1/2007	9
North Navy 3 Firebreak FY08	11/12/2007	5
North Navy 4 Firebreak FY08	11/12/2007	3
North Navy 1 Firebreak FY08	11/16/2007	4
North Navy 2 Firebreak FY08	11/16/2007	3
Quadrangle 1 Firebreak FY08	11/27/2007	3
Quadrangle 2 Firebreak FY08	11/29/2007	5
Total		**115**

The backlog of prescribed burn acres at Alligator River NWR now totals 30,000 acres. The firebreaks in the Parched Corn Bay Compartment are in need of rehabilitation, but this work remains unfunded for another year. With the acquisition of the new Marsh Master II with mower, along with the Geo-Boy brush cutter tractor, we are better able to maintain our firebreak system on an annual basis. This eliminates the need for costly firebreak rehabilitation every three or four years.

We are a long way from meeting our ten-year goals in hazardous fuel reduction at Alligator River, as stated in the 1998 Fire Management Plan. Funding and target allotment shortfalls from previous years have improved during the past two years. This has helped tremendously. We are now depending on Aircraft Rental Agreement (ARA) helicopters which did not provide the coverage needed in 2006. Increasing the burning at Alligator River will hinge on our ability to take advantage of intermittent burn windows and expand our burning season into the spring fire season (March and April), when appropriate.

US Fish and Wildlife Service Fire Management Equipment Operators Eric Meekins and Amy Midgette stand by the wildfire severity helicopter that was brought in on high fire danger days during the unprecedented drought period experienced in 2007. DH

Fire Management Planning:

Fire Program Analysis (FPA):

The Fire Program Analysis (FPA) workload was light throughout most of the year, with the exception of the seven prototype Fire Planning Units (FPU) across the country. These prototypes are developing and testing a new FPA model that will go beyond initial response actions and look at large fire growth, fuels treatments, and prevention. K. Van Druten continued to check fire history data for correct coordinates and stayed informed about the development of the new model through the FPA newsletters and listserve.

In November, news came that LANDFIRE data would be used for fuel models in FPA. LANDFIRE, a national fuel model mapping initiative, had just finished with map zone 58, into which most of the North Carolina Coast FPU falls. K. Van Druten worked with B. Van Druten to identify incorrect fuel models in the LANDFIRE data for our mapping zone and sent the information to LANDFIRE. Hopefully, there will be options to update and improve this data. During December, K. Van Druten also updated NC Coast FPU contact lists in the charter. New guidance on workloads and deadlines is expected early in January. FPA planning activities are expected to greatly increase in 2008.

Local Fire-Related Training:

Locally-offered training included Annual Firefighter Refresher, Marsh Master training and Plastic Sphere Dispenser Operation (PSDO) training. The basic firefighter courses (S-130, S-190 and L-180) were offered and taught at the Elizabethan Gardens in conjunction with the NPS.

Wildland Urban Interface (WUI):

In addition to regular project funding, every year the district has special WUI projects funded by the region. This year's projects included:

Refuge	Project Name	Completed	Acres
Alligator River	(Mech) Access crossings (6)	1/23/2007	2
Mattamuskeet	SW Boundary WUI Break	6/18/2007	10
Currituck	East Long Pond Firebreak	11/16/2007	3
Pocosin Lakes	3 Water Control Structure Projects	11/30/2007	3
	Total		**18**

The crossing contract at Alligator River allowed for the installation of six culverts to increase access to burn units for prescribed burning and suppression. This project was undertaken with FY 2006 funding, as was the SW Boundary WUI Break at Mattamuskeet. All other WUI projects were managed with FY 2007 funds. In addition, the District received $20,000 to apply toward firebreak work.

K. Van Druten served as the COTR (Contracting Officer's Technical Representative) for the contract to construct the SW Boundary WUI Break at Mattamuskeet NWR. She worked with Mattamuskeet Law Enforcement Officer, Chris Smith, to flag the break and conduct periodic checks on the contract. The contractor began work in late May and finished in June. This break covers an old firebreak that runs along the refuge boundary. It had huge trees down across the line. This cutting will improve firefighting response to the refuge in areas where fires have traditionally crossed boundary lines.

During the summer, K. Van Druten worked with contracting to prepare the Statement of Work in the contracts for the East Long Pond Firebreak and Pocosin's water control structures. K. Van Druten also served as the COTR for the firebreak contract which commenced in October. A contractor from New Bern received this contract and completed it in mid-November. This firebreak will allow Currituck to undertake prescribed burning in the burn unit directly behind the village of Carova Beach, NC.

K. Van Druten assisted Pee Dee NWR in District 2 and Great Dismal NWR in the Northeast Region, as they submitted a request asking the North Carolina Forest Service to recognize 15 communities next to these wildlife refuges as Communities-at-Risk (CAR) to wildland fire. Since state forestry organizations have not been able to reach a consensus on how to update the 2001 Federal Register's list of CARs, this is an interim measure to allow these communities to be counted as CARs in Firebase when proposing fire projects. Last year, WUIS Van Druten submitted a list of 30 communities to the NCFS for District 1.

Rural Fire Assistance (RFA):

In September, 2007, six cooperating fire departments had finished their grant spending and were in the process of completing their final paperwork when the region learned that the RFA program would be reinstated for another year. Instead of closing out these grants, the termination dates were extended an additional five years, in anticipation of additional funding. Stumpy Point Volunteer Fire Department was in this group. Guidelines for implementing the FY2008 RFA funding are expected in February.

In June, the District put together a proposal for funding a wildfire simulation drill through the Ready Reserve Program. The proposal was funded and K. Van Druten worked with FMO Carver, the North Carolina Forest Service and Washington County Emergency Management to plan a drill near Lake Phelps. A total of five fire departments participated in the drill in August. It was a success that the District hopes to duplicate with other cooperating fire departments.

Cooperative Relations:

Several meetings to discuss cooperative efforts took place throughout the year with the NC Forest Service. These included the annual NCFS District (4, 7 and 13) cooperators' meetings, as well as several meetings which addressed joint planning efforts like training and management response to wildfires.

The District signed a Memorandum of Understanding in January with the NC Wildlife Resources Commission to cooperate on prescribed burns on refuge and commission lands in the area.

K. Van Druten attended a two-day workshop for the Onslow Bight Fire Learning Network (FLN) on July 10-11. Onslow Bight is a partnership of several land management agencies working together to improve fire management in southeastern North Carolina. Cedar Island NWR is included in this partnership. The group held another meeting in November, during which K. Van Druten gave a short presentation which compared the GIS data in the Southern Wildfire Risk Assessment and LANDFIRE to current refuge data. Other presentations on current research and LANDFIRE applications were quite informative. Next year the FLN will attend one meeting per year.

In Raleigh, the first day of the Eco-Team Meeting, on October 24, was dedicated to presentations by area fire staff. The presentations outlined the various initiatives of the fire program and highlighted some of the latest issues in fire management. Crews and K. Van Druten both gave presentations about District 1. Great Dismal Swamp NWR Fire Technician Kyle Krzywicki gave a presentation about the fire activities in Dismal Swamp NWR and the Virginia refuges.

K. Van Druten is the Chair for the North Carolina Prescribed Fire Council's Outreach and Education Subcommittee. The subcommittee (10) had conference calls in January, May and September. The subcommittee continued to work on improvements to the Council's website and revision of the Communications Plan.

K. Van Druten is also the Chair for the Dare County Firewise Council (9), which held meetings in January, May, June, July, September and November. The meetings included short programs about various Firewise topics.

On December 3, the Dare County Firewise Council launched a website (www.darecountyfirewise.com). As part of the information outreach, the Council mailed over 1,000 postcards to county property owners, to acquaint them with the Dare County Firewise Council and introduce the Firewise program.

10. Pest Control

Phragmites

Phragmites, *Phragmites australis*, continues to be a problem on Alligator River NWR. In 2007, an effort was launched to spray Phragmites on hiking trails at the Alligator River National Wildlife Refuge, as well as in areas where the invasion is encroaching into wooded areas and farm fields. Spraying was initiated on August 11th and completed on August 24th. A total of 15.3 acres was treated by ground application with glyphosate (Aquaneat), mostly from Mackay Island NWR's Marsh Master. Results were excellent. No aerial application was performed in 2007 due to the inability to secure a contract for application. This work will continue in 2008.

In 2007, the refuge received a Volunteers and Invasives Grant for a total of $4100 for work on Alligator River NWR. This money was used to purchase herbicide and safety equipment for volunteers, support volunteers who mapped phragmites and alligator weed, and assisted with the logistics for herbicide application. Volunteers will be used in 2008 to continue mapping areas with invasives, perform surveys of past control sites to determine efficacy, and assist with herbicide applications logistically.

B. Van Druten applied for a Pulling Together Initiative grant through the National Fish and Wildlife Foundation to treat phragmites on Federal, State and private lands in northeastern North Carolina and southeastern Virginia. This grant pulls together seven National Wildlife Refuges, one National Seashore, one State Park, one State DOT, one electric cooperative, one city government and various private landholders. We should find out whether the grant application was successful in May, 2008.

Also in 2007, 160 gallons of Aquaneat (a glyphosate herbicide) and 50 gallons of the surfactant LI-700 were purchased through UAP in Pantego, North Carolina for use in the control of phragmites. Five area suppliers were contacted for bids, with UAP providing the best price. This should give the refuge enough herbicide to spray both Alligator River and Pea Island NWRs in 2008.

Alligator Weed

Alligator weed, *Alternanthera philoxeroides,* is a growing problem on Alligator River NWR. Alligator weed will totally obstruct narrow waterways which are prevalent throughout the refuge. Not only does this impede passage along such waterways, it also restricts the flow of water in

them. For at least three years, local paddling enthusiasts have reported sightings of alligator weed in area waterways. B. Van Druten and Powers initiated spraying on June 21st. Delays occurred prior to that because some of the equipment had broken since the last spray season. Special attention was given to areas treated last year to kill any re-sprouting which had occurred and/or moved into new areas. From June 21st to July 17th, 6.6 acres of alligator weed were treated with Habitat (herbicide) via ground and boat application. Results seemed to match last year's. In the vast majority of areas treated, the weed died off and did not re-sprout. The exception occurred in one section which did not seem to respond to spraying. This herbicide work will continue in 2008.

As part of the Volunteers and Invasives grants, volunteers were trained in alligator weed identification. GPS use and mapping of the paddling trails for alligator weed was scheduled for the fall of 2007. Unfortunately, the owners of 'Thrillguides', our volunteer group for this project, are retired Green Berets who have been called to assist with the training of U.S. military forces. Hopefully, they'll be available to help in the spring of 2008. Their participation in the project will constitute one of the most positive outcomes of the Volunteers and Invasives grants.

An agreement for the treatment of alligator weed with the North Carolina Aquatic Weed Program allowed treatment on Swan Creek, Laurel Bay and Whipping Creek drainages for the first time. These are all tributaries of the Alligator River, which is part of the Pasquotank River Watershed. A total of 4.75 acres was treated as part of this agreement. More would have been treated had a large tree on Swan Creek not impeded the efforts.

Also in 2007, 2.5 gallons of Habitat were purchased through UAP in Pantego, North Carolina for use in the control of alligator weed. Five area suppliers were contacted for bids, with UAP providing the best pricing for delivered product. This should give the refuge enough herbicide to spray in 2008.

Southern Pine Beetle

Trapping of southern pine beetles was done at three locations on the refuge from April through early May. This is a cooperative effort with the North Carolina Division of Forest Resources. The refuge has allocated time and staff to set and check the traps. Results for refuge lands were 3.1 pine beetles per trap per day compared to 5.9 clerids (natural pine beetle predator). This correlated to a predicted static/low Southern Pine Beetle problem for 2007. No survey flights were conducted in 2007 due to a lack of funding.

G. WILDLIFE

1. Wildlife Diversity

The vast expanse of swamp-forest and marsh wetlands on the refuge contains many important wildlife and ecological resources. Though much of the Pamlico/Albemarle peninsula was developed by clear-cutting, peat mining and agricultural conversion, this area remains one of the most remote and diverse swamps in eastern North Carolina.

Alligator River NWR and its surrounding waters support many species of resident and migratory fish and wildlife. Preparation of species lists for the Comprehensive Conservation Plan revealed that, among the diverse assemblage of resident and transient wildlife, approximately 64 species are fish, 264 species are birds, 62 species are reptiles and amphibians, and 41 species are mammals. The refuge supports wildlife species important from both a regional and a national standpoint. Its large size and dense vegetation make the refuge a haven for species such as the black bear. Also, the refuge harbors many species adapted to living in forested habitat as opposed to disturbed areas such as field edges. The refuge provides habitat for the endangered red-cockaded woodpecker, migrating bald eagles and peregrine falcon. Alligator River NWR is at or near the northern limit of ranges for several vertebrate species, most notably, the American alligator.

Yes, we have alligators at Alligator River NWR as is evident by this 10+ footer in the US Highway 64 canal. DS

2. Endangered and/or Threatened Species

Three endangered species have been documented on the refuge. Management programs are in place for the red wolf and red-cockaded woodpecker. An inventory program, although inactive, is in place for the American alligator, which is considered threatened by similarity of appearance to the American crocodile in North Carolina. The bald eagle was de-listed during the past year.

a. Federally Listed Endangered and Threatened Species

***American alligator* (TSA):** American alligators reach the northern extent of their range on the refuge and probably were never very numerous in the area. Although de-listed, the alligator remains classified as threatened by similarity of appearance (to the American crocodile) in North Carolina. The highest density alligator population is consistently found on Whipping Creek

Lake. A few have been seen each year in the marshes, ponds, streams and canals. Sightings of alligators throughout open areas of the refuge seem to be increasing. Alligator surveys were not conducted in 2007 due to insufficient funding and staffing.

And yes alligators are reproducing on the refuge as is evident by this 2 footer in a refuge canal. DS

Red-cockaded woodpecker **(Endangered):** Prior to Hurricane Isabel, trails were cut to previously tagged cavity trees south of Whipping Creek Road. Of the three known clusters on the refuge, one produced a fledgling. None of the US Highway 264 clusters were accessible during the 2004 nesting season. It was not possible to assess nesting activity during 2007, as the cavity tree in the only accessible active cluster was dead and leaning at a 45◦ angle.

Damage from Hurricane Isabel in September 2003 ranged from moderate to extensive in red-cockaded clusters. It appears that 50-70% or more of the cavity trees were blown down or broken off. However, most of these trees were considered inactive. An attempt to conduct an assessment was made to determine the need for artificial cavities. Basically, the post-Isabel pocosin is inaccessible from the ground. This process is seriously complicated due to the fact that there is no funding or staffing allocated for such biological work on the refuge. The basic conclusion from the 2005 RCW efforts is that the refuge needs to renew initiatives to locate active clusters and cavity trees by helicopter. This will take special funding and additional staff. Due to the funding and staffing situation in 2007, no RCW work was done this year. A request to fund aerial surveys was submitted, but funding was not provided.

Red wolf **(Endangered):**

Red Wolf Wild Population

The Red Wolf Recovery Program of the U.S. Fish and Wildlife Service, located in northeastern North Carolina, manages the world's only wild red wolf (Canis rufus) population. Fiscal Year 2007 represented the 20th consecutive year of successful management. By spring 2007, the wild population had produced over 400 wild pups, with 31 pups born in the wild in 2007. The wild population of red wolves was composed of more than 100 wolves. They live in about 18-22 packs distributed across 1.7 million acres in five North Carolina counties: Dare, Tyrrell, Hyde, Beaufort and Washington. Population monitoring was done in a number of ways, including: trapping, scat sampling and tracking using ground and aerial telemetry.

Red wolf pups lying behind a fallen branch
GK

Red Wolf Adaptive Management Plan

The Red Wolf Adaptive Management Plan began in 1999 and was implemented by the Red Wolf Recovery Program field team, headquartered at Alligator River NWR. An independent panel of scientists, known as the Red Wolf Recovery Implementation Team, met twice a year to review pertinent field data, discuss red wolf and coyote management and population dynamics, and make recommendations to the Service regarding adaptive management and red wolf restoration. Reviews by the Recovery Implementation Team showed the Plan to be effective in restoring the wild red wolf population and managing competitors (eastern coyotes). Since 1999, the number of red wolf breeding pairs (packs or family groups) and red wolf litters trended upward, while the number of breeding coyotes or hybrid litters trended downward. The Adaptive Management Plan utilized a three-zone approach over the five-county restoration area. Overall, the Red Wolf

Adaptive Management Plan showed good progress in restoring red wolves and managing coyotes.

Red Wolf Captive Breeding Program

As part of the Red Wolf Recovery Program, the Red Wolf Captive Breeding Program is effectively implemented by 40 captive facilities across the United States. The effort is overseen by the Red Wolf Recovery Program Team Leader, Bud Fazio, located at the Alligator River National Wildlife Refuge and was coordinated daily by the Red Wolf Species Survival Plan Coordinator, Will Waddell, at the Point Defiance Zoo and Aquarium in Tacoma, Washington. As of December, 2007, the current total number of wolves in the captive population was 203 (this number changes frequently). Red wolves are held in captivity for a number of reasons, including cooperative breeding, reproduction research and conservation genetics work. The breeding program maintains genetic diversity among red wolves and prepares a small number of red wolves for possible release into the wild.

The Red Wolf Recovery Program was nominated for, and won, the Association of Zoos and Aquariums Award for 2007. This is a prestigious national award and a tribute to long-term conservation efforts in red wolf restoration. Will Waddell accepted the award for the Red Wolf Recovery Program.

Will Waddell accepting Association of Zoos and Aquariums Award
PDZA

Red Wolf Island Programs

The Red Wolf Recovery Program and Red Wolf Captive Breeding Program partner with two U.S. Fish and Wildlife Service National Wildlife Refuges to raise red wolves in wild settings on islands. Young wolves growing up on these islands learn survival skills that prepare them for release into the wild red wolf population in northeastern North Carolina. St. Vincent National Wildlife Refuge in Florida maintains a pair of red wolves for breeding in the wild. The pair had pups in 2007. Bulls Island is part of the Cape Romain National Wildlife Refuge in South Carolina and currently has no red wolves on site. There is a breeding pair and pups on Cape Romain's mainland property at the Sewee Visitor Center. The Cape Romain Refuge educates approximately 200,000 people per year about red wolves. These island programs play vital roles in the red wolf captive breeding program through education and the re-introduction of wild-born red wolf pups for release.

Red Wolf Landowner Agreements

The Red Wolf Recovery Program is partner to conservation and access agreements with two different owners of private land, comprising 15,445 acres. These tracts of land are strategically

selected to maximize monitoring of red wolves and other canids in the northeastern North Carolina five-county experimental population area.

Red Wolf Genetic ID Project (including M.S. & PhD**)**

The Red Wolf Recovery Program is working with wildlife genetics researchers to identify gene loci in red wolves and coyotes. This information provides red wolf biologists with data to distinguish and manage red wolves and other canids, such as coyotes, in the recovery area. Genetic analysis provides invaluable statistics on which to base sound management decisions that will ensure the success of the red wolf reintroduction effort and the long-term survival of the species. Both Master's-level and PhD work at the University of Idaho have identified 18 gene loci in red wolves to date, making it easier to distinguish between red wolves and eastern coyotes.

Modeling the Wild Red Wolf Population

The Red Wolf Recovery Program is partnering with researchers from Trent University in Canada, who are modeling survival and demographics of the North Carolina wild red wolf population. The population demographic model shows that the wild red wolf population will survive successfully with assistance from biologists who are managing problem coyotes.

Red Wolf Captive Research Facility at North Carolina State University

In a joint effort between North Carolina State University and the Red Wolf Recovery Program, important research on captive red wolves is conducted annually. Research is being conducted on such topics as disease detection, physiological processes, food habits and behavior characteristics. Ultimately, information learned at the North Carolina facility will be very helpful in both the captive breeding effort and wild population management effort of the Red Wolf Recovery Program. Veterinary school faculty member, Dr. Michael Stoskopf, is the lead facilitator of the Red Wolf Recovery Implementation Team.

Howling Safaris 2007

Approximately 1,100 participants
19 Programs (1 was cancelled due to weather)

Due to overwhelming demand for howlings, a reservation system was instituted in 2003. The program continued to be free of charge during 2006. The Red Wolf Coalition is responsible for registrations and limits the capacity to 100 people per safari; however, the volume could easily have exceeded that number. Because of increasing registration requests, a $5.00 administration fee was instituted in 2007. This nominal charge did not affect the number of participants.

Red Wolf Program Presentations

The Red Wolf Recovery Program is contacted by a number of organizations, clubs and schools annually to give red wolf presentations. During 2007, these presentations reached over 16,000

people through off-site programs. The eight-member red wolf staff participates in red wolf outreach and education as their schedules permit.

The "Far Traveler" teacher curriculum celebrated its 10th year in circulation and, with the original author's assistance, was revised in 2007. Teacher workshops will continue in 2008, beginning with an early seminar. Educators can select "Far Traveler" workshops to fulfill one of the requirements for North Carolina Environmental Education Certification. Also, as part of red wolf educational outreach, Discovery Boxes are circulated among educators. A Discovery Box contains red wolf teaching tools such as a red wolf pelt, collar, track cast, "Recovering a Species" video, howling cassette and informational materials. New to the Discovery Boxes for 2007 are two library books (one donated and the other funded through a partnership effort), and a small photograph album. The howling cassette was transferred to CD format and the VHS, "Recovering a Species," was converted to DVD. Discovery Boxes traveled to 16 different educational facilities in 2007, reaching approximately 1,500 students and adults.

Ford Mauney kneeling next to a litter of red wolf pups on a sweatshirt
FWS

Red Wolf Coalition

The Red Wolf Recovery Program continues to work closely with the Red Wolf Coalition (RWC), a citizen-support organization whose mission is to educate and promote community awareness for the red wolf. Its Board of Directors consists of 12 members from various locations in North Carolina, Virginia, California, Ohio and Washington D.C. This non-profit organization co-sponsors howling safaris with the Fish and Wildlife Service and participates in outreach events throughout the year. Kim Wheeler has been the Executive Director for three years, with an office in Columbia. In 2007, the RWC partnered with the USFWS, and donors, to bring a canid exhibit to the Pocosin Lakes National Wildlife Refuge in Columbia, NC. The

exhibit cost nearly $10,000 and was viewed by hundreds of visitors, including students, from May through October, 2007.

The International Wolf Center dedicated its winter 2007 edition of "International Wolf" entirely to red wolf content. The 30-page magazine has a readership of approximately 10,000.

The International Wolf Center's first Red Wolf Country Discovery Trip was hosted by the RWC. Staff from the Red Wolf Recovery Program participated in program offerings. Sixteen people attended and the trip was so popular that another one has been scheduled for 2008.

Outreach Products

Working with the Timber Wolf Alliance and various artists, a red wolf image was chosen for the 2007 "Wolf Awareness Week" poster. The image, created by Elise Hammond, will eventually be offered as a signed-and-numbered print for public purchase through the Red Wolf Coalition.

Pelts from a gray fox and an eastern coyote were added to the outreach educational materials.

The "Red Wolf Journal" replaced the "Red Wolf News," and was published twice in 2007.

A handout was created and sent to all libraries and middle schools in the five-county restoration area, offering red wolf educational programs from the Red Wolf Recovery Program and Red Wolf Coalition. Several schools have already asked for a speaker.

Twenty Species Survival Plan educators from red wolf captive facilities across the US traveled to Manteo, NC, and participated in a red wolf educators' workshop.

Red Wolf Education and Health Care Facility

The facility contractor completed the building in February, 2007, and keys were exchanged for the Red Wolf Education and Health Care Facility, located in Columbia, NC, on the PLNWR. The facility will provide red wolf processing space for wildlife biologists, as well as public education programs. Eventually, red wolf enclosures are planned behind the building site. When staff is available, education programs will take place at the facility as well as providing tours for visitors by appointment.

The new Red Wolf Education and Health Care Facility
RN

b. State Listed Endangered and/or Threatened Species

Among other species existing on the refuge and not federally listed, the state of North Carolina lists some as 'endangered', 'threatened', 'of special concern' or 'significantly rare'. Although the refuge is not managed for all of these species, present practices do provide benefits for many of them. Species occurring on the state list and refuge are:

Least tern (Special Concern); **Common tern** (Special Concern); **Gull-billed tern** (Threatened); **Black skimmer** (Special Concern). These species are not likely to be seen on most of the refuge. They may be observed flying over the waters of Pamlico Sound, Croatan Sound, Albemarle Sound, Alligator River, and creeks and lakes within the refuge. There are no sites suitable for nesting on the refuge.

Little blue heron (Special Concern); **Snowy egret** (Special Concern); **Tri-colored heron** (Special Concern). These species are found around canals and on creeks throughout the refuge. Very little is known about numbers of birds on the refuge. Nesting has not been documented on the refuge.

Glossy ibis (Special Concern): The glossy ibis can be found in fields within the farm units. Very little is known about numbers of birds on the refuge. Nesting has not been documented on the refuge.

Peregrine falcon (Endangered): The Arctic peregrine, *Falco peregrinus tundrius* can be observed on the refuge with some regularity during migratory periods. Nesting does not occur on the refuge.

Timber rattlesnake (Special Concern): The timber rattlesnake is found throughout the refuge and is common relative to other snakes. Little is known about the life history of this species on the refuge.

Pygmy rattlesnake (Special Concern): The pygmy rattlesnake has not been documented on the refuge, but has been found in Hyde County. Since the refuge extends into Hyde County on the southern end, it is conceivable that the species could occur on refuge land.

Carolina water snake (Special Concern): The Carolina water snake is found throughout the refuge in canals, marshes, creeks, and other water bodies where there is an adequate food supply. Little is known about the life history of this species on the refuge.

Diamondback terrapin (Special Concern): The diamondback terrapin is found along the estuarine borders of the refuge. Little is known about the life history of this species on the refuge.

3. Waterfowl

Historically, large numbers of waterfowl have not used ARNWR due to its forested terrain, but the refuge supports a substantial year-round population of wood ducks using the numerous ditches, canals, creeks, lakes, natural openings and swamps. A large number of waterfowl species can be found on the Alligator River and the associated sounds during winter months. The addition of the 5,100 acres of farmland in 1988 substantially increased opportunities for waterfowl management on the refuge. This management has been achieved primarily by converting farm fields, classified as prior converted wetlands, to moist soil management units.

Results of this year's surveys are provided in Table ***G-3-1*** below. Tundra swan, pintail and green-winged teal accounted for over 85% of the total waterfowl use, and they are certainly the most common species found on the refuge during the wintering period. Use-data for Canada geese and snow geese is not measurable due to the very low numbers of these birds. Historically, the refuge has never been used by either the snow goose or the Canada goose. However, a small number of Canada geese were observed consistently throughout the 2006-2007 season in the farm units.

Large numbers of wood ducks can be observed on the refuge, but they tend to use the flooded farm fields for roosting, as we have observed in our surveys (which are conducted in daylight hours). Wood ducks are most common in the moist soil units when cold weather causes the sloughs and swamps to freeze, while the open fields with full exposure to sunshine thaw sooner.

There appears to be an overall increase in the numbers of most waterfowl, with the exception of diving ducks such as scaup, bufflehead and ruddy ducks. Although the table shows a decrease in peak numbers for mergansers, the number of use-days increased this year, which indicates more sustained use throughout the season. Figures G-3-1 and G-3-2 illustrate seasonal shifts in numbers for each species.

SPECIES	PEAK PERIOD	***SURVEY*** PEAK #	# USE DAYS 2006-07	% TOTAL USE DAYS 2006-07	USEDAYS % diff from 2005-06 avg	USEDAYS % diff from long-term avg
Tundra swan	Dec	2892	107975	7.8	10	88
Snow goose	N/A	0	0	0	0	0
Canada goose	Jan	52	1961	0.1	324	210
Mallard	Jan	1027	36694	2.6	71	-14
Black duck	Jan	573	21326	1.5	79	4
Gadwall	Mar	325	16871	1.2	114	77
Widgeon	Feb	792	19634	1.4	718	59
Pintail	Jan	21554	845732	61.0	353	222
GWT	Dec	8187	251714	18.1	104	36
BWT	Mar	39	1337	0.1	995	101
Shoveler	Mar	132	5820	0.4	55	104
Wood duck	Dec	143	3068	0.2	-13	-80
Ringneck	Jan	859	33655	2.4	240	-35
Redhead	N/A	0	0	0.0	-100	-100
Canvasback	N/A	0	0	0.0	-100	-100
Scaup	Mar	3	39	0.0	-97	-68
Unknown	Feb	156	2773	0.2	-12	-85
Bufflehead	Dec	3	66	0.0	-87	-30
Ruddy	Feb	65	1821	0.1	-23	361
Merganser	Dec	40	698	0.1	1296	484
Coot	Mar	707	37211	2.7	118	352

It is not unusual for waterfowl to peak in early-to-mid-December, drop to relatively low numbers, and then peak at a lower level from mid-to-late-January. Dispersal to other suitable, natural or well-managed habitat within the wintering area is the most logical explanation for such observations.

Figure ***G-3-1***: Abundance of tundra swans and geese at Alligator River National Wildlife Refuge during the 2006 – 2007 wintering period.

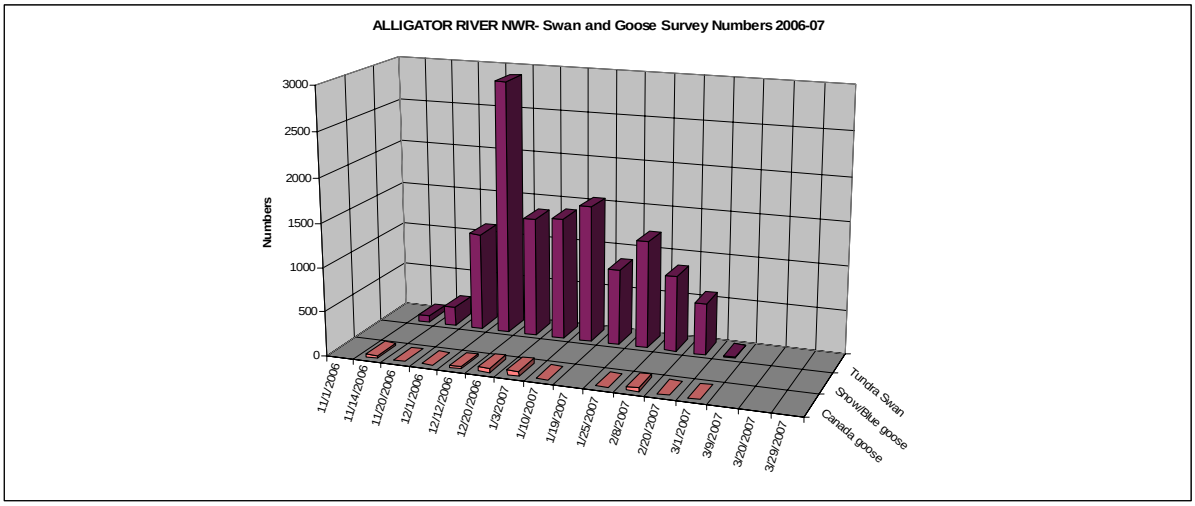
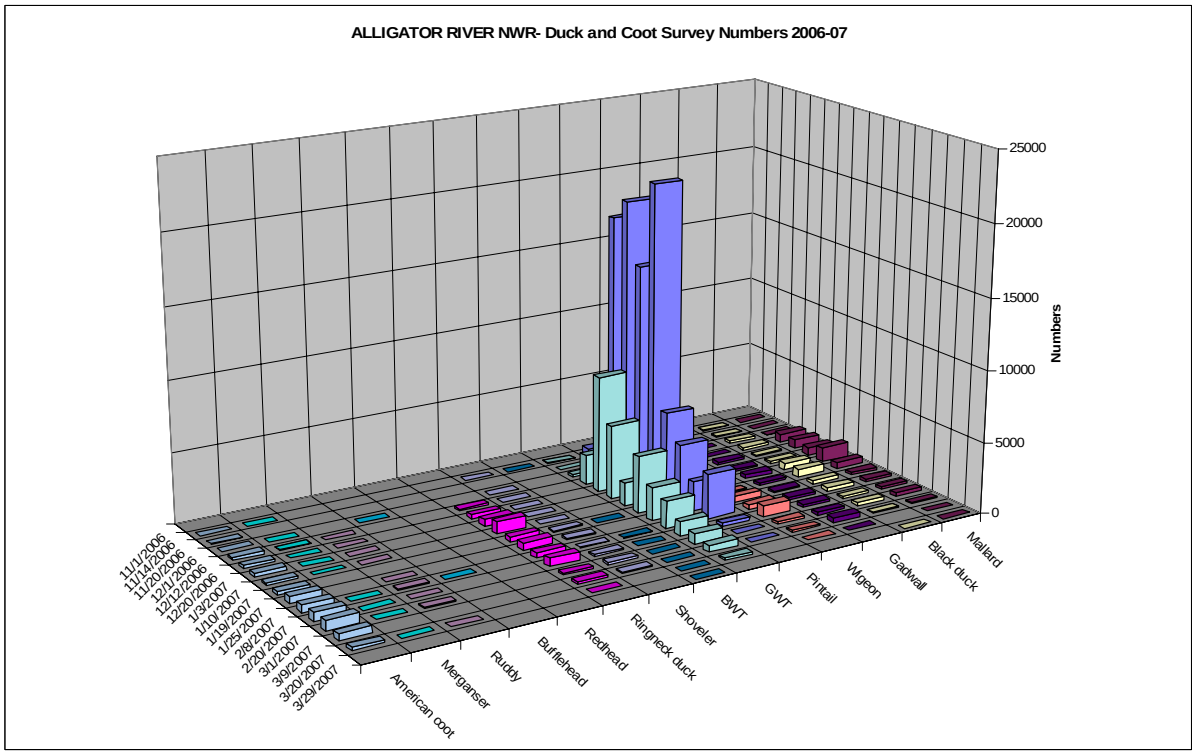


Figure ***G-3-2***: Abundance of ducks at Alligator River National Wildlife Refuge during the 2006 – 2007 wintering period.



In order to assess the quantity and quality of moist soil plants for waterfowl during the 2006-2007 wintering period, it is necessary to examine vegetation data from the fall of 2006. Vegetation transects were not done in moist soil units since all were planted in small grain crops in preparation for the 2006-2007 wintering waterfowl. With regard to moist soil management, 30%-50% of each unit can be flooded by gravity flow. Since there are no pump stations capable

of pumping water into the units, the remaining increases in water level are due to rain, or by positioning portable pumps to targeted units. As the wintering period progresses, it is interesting to note that the higher elevation moist soil units gradually become flooded and waterfowl use shifts to these units. However, these units have considerably lower use overall when averaged over the season. If water becomes too deep in a moist soil unit, dabbling ducks either quit using it or just use it for roosting, resting and loafing. All is not lost if water levels do not cover each field entirely within the moist soil units. First, there is no evidence that waterfowl have ever completely eaten the entire moist soil seed production in the flooded segments when fields are only partially flooded. Second, the non-flooded portion of the moist soil unit provides valuable habitat for marsh birds, especially rails, as well as grassland birds and numerous other wildlife species. The prey base for the red wolf and a large number of raptors are among those species which thrive in the non-flooded areas. Completely flooding the entire moist soil unit acreage eliminates valuable habitat for other wildlife.

Incorporation of filter strips on each side of each farm field during the 2000 growing season has been very beneficial for grassland birds and other wildlife. An unpredictable consequence of these filter strips (75 feet wide on each side of the field) was the effect they had on field use by tundra swans. These filter strips effectively reduced field width to half of the original 150 feet. Annual and perennial weeds growing in these filter strips attain heights that "enclose" the fields, making them too narrow for use by swans. Future management of these filter strips for shorter grassland communities should solve this problem. Filter strips of some dimension are important, even in moist soil units, for good farming practices to protect water quality and wildlife habitat, especially for grassland birds. These grasslands become important marsh bird habitat as moist soil units or, in some cases, farm fields are flooded in the fall.

The Wood Duck Nest Box Program was inactive. Since use of nest boxes has always been consistently low, checking the boxes is not a high priority. Traditionally, fewer than 2% of the nest boxes have ever shown any signs of wood duck use. However, nest boxes are used by other species of birds, as well as bats and bees. At the last count, less than 39 boxes still remained throughout the refuge.

4. Marsh and Water Birds

Although management of moist soil units is focused on waterfowl, numerous other marsh and water bird species can be observed in these units provided that water levels are kept at appropriate levels for dabbling ducks. Herons, egrets, woodcock, snipe and rails appear to be most numerous. Killdeer and yellow legs are also common. Kingfishers are often seen adjacent to canals with deeper, more permanent water. The anhinga has been observed on the refuge on rare occasions. Although undocumented for several years, anhinga nesting has been observed on at least one occasion within the southern portions of the refuge. At the present time, there are no formal surveys for these species. They are counted while conducting winter waterfowl surveys. However, marsh and shore bird numbers are relatively low, resulting in data analysis that is not meaningful.

6. Raptors

Many raptor species can be observed on the refuge. Among the most common are the red-tailed hawk, red-shouldered hawk, and northern harrier (marsh hawk). The kestrel and merlin are also common species. Owl species include great-horned owl, barred owl, short-eared owl and screech owl. Peregrine falcons are known to move through the general area during migration. During the course of the year, immature and adult eagles can be observed on the refuge. Although eagle sightings are becoming more common, only two eagle nests have been confirmed on the refuge as of this writing. No nests were confirmed during 2007. During late 2004, some preliminary effort went into establishing grassland bird and diurnal raptor surveys in the farm fields. Routes and protocols for raptor surveys were established during 2005 and data collection began. Data collection continued throughout 2007. Results so far show that the northern harrier, turkey vulture and red-tailed hawk are the most common raptors. There was a notable increase in bald eagle numbers and a notable decrease in peregrine falcons. Late summer months are not very productive for data collection due to low raptor numbers. Table ***G-3-6*** presents the data for the raptor survey. Interpretation of the data is somewhat restricted because the surveys are limited in number and do not represent a uniform effort over the entire year. The survey will be continued in 2008 and an effort will be made to establish a more systematic sampling regime over the farm unit.

Table ***G-3-6***: Summary of raptor data collected from farm units at Alligator River NWR during 2007. The total number counted for the year is shown in the # column; the % column is the percent of total birds counted; and the N_{max} column is the maximum number counted on any survey for the entire farm unit.

Species	#	%	N_{max}	Peak date
Bald eagle	44	3.6	6	1/11/07
Sharp-shinned hawk	5	0.4	2	2/12/07
Northern harrier	459	37.2	63	2/12/07
Red-tailed hawk	199	16.1	20	11/6/07
Red-shouldered hawk	2	0.2	1	N/A
Rough-legged hawk	0	0.0	0	1/11/07
Broad-winged hawk	0	0.0	0	N/A
American kestrel	55	4.5	9	4/20/07
Merlin	4	0.3	2	4/20/07
Peregrine falcon	2	0.2	1	1/18/07
Black vulture	1	0.1	1	4/5/07
Turkey vulture	434	35.2	44	3/27/07
Osprey	5	0.4	2	4/25/07
Unknown raptor	24	1.9	3	1/11/07

7. Other Migratory Birds

The refuge is host for migratory species such as the mourning dove and the American woodcock. Several species of rail are found in the moist soil units when they are managed to maintain moist

soil vegetated habitat, and woodcock may also be found throughout. In addition, the vast expanse of forested habitat on the refuge provides for a wide range of neo-tropical migrant birds. There are plans to begin neo-tropical migrant bird surveys as soon as budget and staffing permit.

8. Game Mammals

White-tailed deer are found on the refuge. Although carrying capacity for pocosin habitat is considerably less than other habitat types - such as bottomland hardwoods - deer population size appears to be relatively constant and they are providing sportsmen with considerable recreational opportunity.

Other game mammals on the refuge include the gray squirrel, cottontail rabbit and marsh rabbit. Although the black bear is abundant on the refuge, there is not a hunting season for the bear on the refuge at this time.

10. Other Resident Wildlife

Wild turkeys are observed frequently during the spring and summer. During the fall and winter, flocks of 6-20 birds were observed in various locations, totaling over 30 birds. Other turkeys were observed over much of the refuge, even along roads transecting pocosin habitat. Turkey numbers have been steadily increasing since the restoration project began in 1999 with the release of 16 birds.

15. Animal Control

Beaver numbers are rapidly increasing, and so are all of the associated problems. Removing dams from culverts and canals is an ongoing maintenance issue. Beaver population management practices have been implemented and will most likely become a permanent component of refuge management activities.

H. PUBLIC USE

1. General

Public use trends continue to move upward in the non–consumptive areas. Local groups, including the Outer Banks Paddlers Club and the North Banks Bird Club, use and promote the refuge through a variety of means. The Milltail Creek Paddling Trail system has been especially popular.

The total number of visits to the refuge in 2007 was estimated to be 36,000. Administrative offices for the refuge remained in the General Services Administration (GSA) leased office space in Manteo. A few visitors continued to locate the office, but most information was disseminated through web pages, telephone, correspondence or the news media. During 2007, the refuge continued to focus on providing a greater number of media contacts, while keeping the messages short and simple. A total of 53 news releases were distributed in 2007.

2. Outdoor Classrooms – Students

Creef Cut Wildlife Trail and Sandy Ridge Wildlife Trail are used frequently by groups of students on the way to and from the Outer Banks from inland areas. Both trails are safe and accessible places where children can stretch their legs, work off some energy from a long bus ride, and learn something in the process. Some of these groups contact the refuge to request a leader to work with their groups. As staff time allows, and as volunteers are available, these requests are usually met. A growing number of schools are also making the refuge their ultimate destination, and are requesting a variety of programs. Staff provided educational programs to 178 students on-site in 2007. During off-site educational visits, programs were conducted for 945 students.

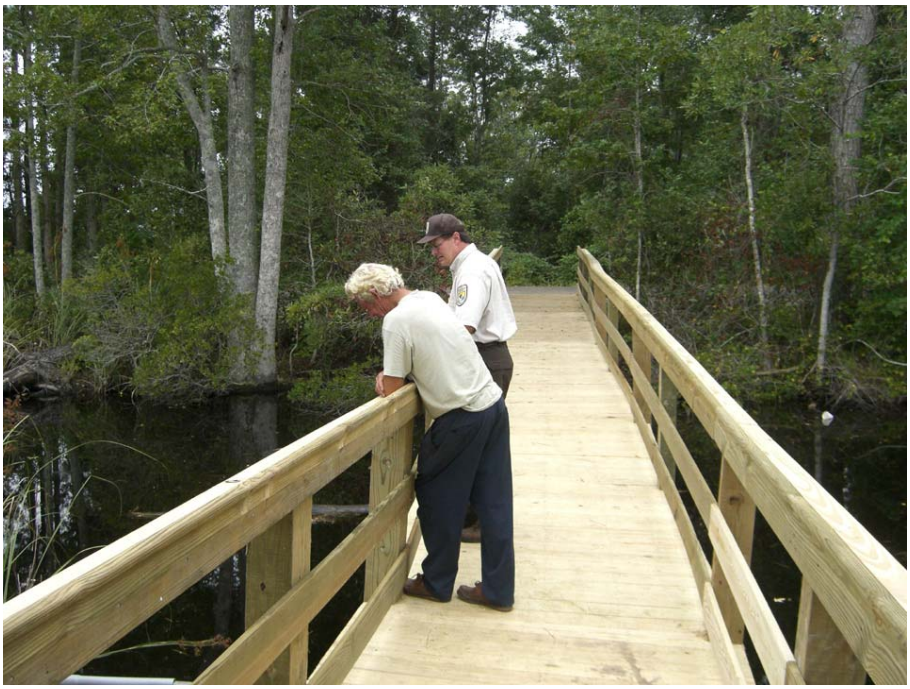
3. Outdoor Classrooms – Teachers

The Red Wolf Recovery Program reached over 16,000 people through off-site programs during 2007 and for the 10th year held a "Far Traveler" teacher workshop, for more details see section G-2 under "Red Wolf Program Presentations."

Since Alligator River NWR and Pea Island NWR are located in an area rich in conservation education/interpretation agencies, these refuges do not receive the requests common to other stations which are often the sole source available. The North Carolina Aquarium, Jockey's Ridge State Park, Nags Head Woods Ecological Preserve and Cape Hatteras National Seashore offer environmental education and teacher training activities. Teachers in the region are constantly encouraged to attend such functions. For this reason, the refuge has chosen to focus more on alternate educational needs, rather than attempt to compete with the programs offered by the other conservation agencies.

4. Interpretive Foot Trails

Sandy Ridge Wildlife Trail and Creef Cut Wildlife Trail continue to be used by individuals and groups. With 2300 feet of boardwalk, Sandy Ridge Trail is one of the best kept secrets on the refuge! Full potential for use of these trails has not been reached. Refuge staff tried to increase use of the trails by offering programs and guided hikes for special groups and the visiting public.



The Creef Cut Wildlife Trail got a new boardwalk in 2007. Jeff Harris and DRM Scott Lanier examine the new bridge
BS

Though not a foot trail, the Milltail Creek Canoe/Kayak Trail System continues to be quite popular. On most days, there are several groups using the trail. If there were a local place to rent canoes or kayaks, use would increase dramatically. However, the demand is not great enough to consider a concession for this purpose. Three local businesses were issued special use permits (SUP) to conduct guided canoe or kayak tours on the Milltail Creek Canoe/Kayak Trail System during 2007. Approximately 11,000 visitors participated in guided tours provided by the holders of these SUP's.

Approximately 3,500 people used Alligator River NWR walking trails during 2007. It is anticipated that there will be a continued increase in trail use on this refuge for some time to come.

5. Interpretive Tour Routes

Approximately 20,000 visitors used the paddling trails, and 2,000 used the Wildlife Drive.

6. Interpretive Exhibit/Demonstrations

Refuge staff manned displays and exhibits at various annual events around Dare County and eastern North Carolina. Interpretive specialists, the fire program educator and staff from the Red Wolf Program were able to participate in conservation-themed festivals.

WUIS Van Druten and Pocosin Lakes Forestry Technician Kenny Powell staffed a fire exhibit at the 4th Annual Plymouth Forest Festival on May 5. They displayed the Fire in the Carolinas, one of the new exhibits purchased by the Regional Fire Management Office. About 75 people came by the booth.

WUIS Van Druten helped staff a display at the NC Forest Festival in Plymouth using one of the new displays purchased by the Regional Office KV

WUIS Van Druten represented the Dare County Firewise Council at a presentation for the North Outer Banks Rotary Club on January 16. The presentation provided a quick overview of Firewise principles with a further focus on Firewise landscaping. About 20 business and community members from across the county were present.

As part of the Wings Over Water festivities, the refuge hosted the annual Wildfest on Saturday, October 21st. The event was held at the former Manteo Middle School (now owned and operated by the College of the Albemarle). Educational exhibitors included NOAA/Marine Mammal Stranding Network, NPS, Merchants Mill Pond State Park, Dare County Firewise Council, Dare County Master Gardeners, Red Wolf Coalition, OBX Center for Wildlife Education and the NC Aquarium. An estimated 550 people attended the event. On October 20, Fire Intern Brett Idol ran a Firewise booth at Wildfest.

The Creef Cut parking area and Kuralt Trail kiosks continue to orient and educate visitors about the refuge. Refuge visitors can also pick up hunt leaflets and refuge maps from brochure boxes posted near the kiosks.

The refuge had exhibits located at the Aycock Brown Welcome Center in Kitty Hawk, which received 338,794 visitors during 2007.

Regularly scheduled 2007 interpretive/educational programs for the refuge have been outlined in Table ***H-6-1***. Fall, summer, and spring guided canoe tours were scheduled for a $35 fee.

During the summer, weekly black bear and red wolf howling programs were offered at Alligator River. Red wolf howlings have proven to be very popular programs on the refuge. Due to overwhelming demand, a reservation system was instituted in 2003. The program continued to be free of charge during 2006. The Red Wolf Coalition is responsible for registrations and limits the capacity to 100 people per safari, however, the volume could easily have exceeded that number. Because of increasing registration requests, a $5.00 administration fee was instituted in 2007. This nominal charge did not affect the number of participants.

Table ***H-6-1***. Alligator River NWR Public Use Programs

Program	#Programs	#Participants
Red Wolf Howlings	19	1,100
Canoe Tours	66	721
Bear Necessities	12	340
Purple Martin Madness	4	100

7. Other Interpretive Programs

Refuge staff manned displays and exhibitions at various annual events around Dare County and eastern North Carolina. Interpretive specialists, the fire program educator and staff from the Red Wolf Program were able to participate in conservation-themed festivals, including the Museum of the Albemarle's Student Day on the River (1000); Fun, Safety and Education Day in Elizabeth City (3,000); and the Manteo and Stumpy Point Christmas parades.

The Red Wolf Recovery Program is contacted by a number of organizations, clubs and schools annually, all seeking access to red wolf presentations. During 2007, 21 presentations reached over 16,000 people through off-site programs.

Children learning about red wolves at Thorndon Primary, Wellington, New Zealand
FWS

8. Hunting

The Alligator River Master Plan, written shortly after the refuge was established, divided the refuge into three basic public use areas, with several additional safety or management zones closed to all hunting. As new areas have been acquired, they have been added to one of the three existing categories or, as in the case of the farm fields, put into a newly-created category.

With additions and deletions of land in the refuge, the ratio of land designated for hunting with chase dogs and land closed to the use of chase-dogs has remained relatively constant (1:1). With reviews and changes of the Master Plan, some changes in hunting areas have occurred. However, the ratios of lands open to still hunting and lands open to chase-dog hunting have remained approximately the same.

For the fifteenth season, refuge hunting permits were required for all hunts. The permit system has been readily accepted by hunters. Again this year, the hunt leaflet contained the permit. By signing the permit, hunters acknowledged that they had read and understood the leaflet. This system has worked well on this refuge and has significantly reduced the effort required to change regulations.

White-tail deer continue to be the most sought-after game species on refuge lands. Alligator River contains over 150,000 acres of habitat, traversed by more than 150 miles of unimproved roads. These factors make it difficult to establish effective hunter check stations.

This year was Dare County's seventeenth annual bear season since the protocol was reinstated by the NCWRC and County Commissioners. Bear hunting is not allowed on the refuge. Refuge officers and biologists monitor bear hunting activities adjacent to refuge lands.

Again this year, extra effort was made throughout the seasons to ensure that leaflets were always available, since they contained the required hunting permits. The effort was minimal, since routine patrols passed the boxes frequently.

Archery season ran from September 10 to October 6. Muzzle loader season lasted October 8-13. Regular gun season began October 15 through January 1. Laurel Bay unit was open September, October and February. The Laurel Bay unit of the Farmfields Area has become a popular area for quail hunting. Raccoon, squirrel and rabbit also remain popular species for small game hunters.

Waterfowl seasons were Oct. 3-6, Nov. 10 – Dec. 1, and Dec. 15 – Jan. 26. A limited amount of waterfowl hunting took place on the refuge, but most occurred over open water in the sounds and in Milltail Creek. The farm fields were open to public use during September and October, however, the area was closed to waterfowl hunting.

Though the regional hunting policy for youths has been difficult to enforce, the fact that Dare County Schools already had a state-sponsored Hunter Safety Course as a part of the seventh and eighth grade curriculum certainly helped. Since 1991, North Carolina has required all first–time hunters to successfully complete the Hunter Safety Course. In addition to the courses offered in the public schools, NCWRC Officer, Mark Cagel, and his associates conducted several extra classes to enable other youths/adults in the area to qualify to hunt on the refuge. The refuge staff has yet to hear of any person who has needed the course and could not find a class.

Estimated public hunting activity:

Activity	Visits
Waterfowl	400
Big	1487
Upland Game	200

Unfortunately, hunting visits are, at best, an educated guess on our part. With so many different entrances to the refuge and so few officers, the only way to estimate hunting activity is by anecdotal information and leaflet distribution.

There are very few places to hunt quail or rabbit on the refuge. Small game hunting primarily includes raccoon, squirrel and rabbit.

9. Fishing

The heaviest recreational fishing effort in the vicinity of the refuge is in the surrounding sound system from October through April. Fishing pressure on the refuge is relatively low and is a reflection of the isolation of the area and limited access, rather than low catch quotas. Angling for bluegill, crappie, chain pickerel, channel catfish, flier, largemouth bass and yellow and white

perch is considered good. During 2007, there were an estimated 2,000 fishing visits to the refuge. Frog gigging is allowed on the refuge by special use permit.

10. Trapping

Since trapping is considered a commercial use of the refuge and therefore prohibited, neither visits nor activity hours are normally recorded under public use. For the 2007 trapping season, no special use permits were issued for refuge trapping.

11. Wildlife Observation

Canoeists and kayakers enjoyed paddling on Milltail Creek and Whipping Creek, where they might observe an occasional alligator, wood duck brood, or other wildlife in the area. The Milltail Creek Canoe/Kayak Trail has encouraged folks to come to the refuge for wildlife observations.

Wildlife photographers visited the refuge seeking an opportunity to photograph black bear, deer and any number of birds and other animals. General habitat scenes were popular for an adventuresome few.

Mike and Peggy Eubank and Marlene Schumm scan the fields of Alligator River National Wildlife Refuge for birds as a part of the International Big Sit. The Alligator River Big Sit Team recorded 40 species of birds near the intersection of Milltail and Sawyer Lake Roads.
BS

The following figures represent wildlife/wildlands observations during 2007:

Activity	Visits
Foot	3,500
Vehicle	2,000
Boat	20,000

17. Law Enforcement

During 2007, law enforcement was conducted on the refuge by Refuge Officer Frank Simms, with assistance from Refuge Officer Chris Smith, of Mattamuskeet National Wildlife Refuge and C.P. White of the North Carolina Wildlife Resource Commission.

Officer Simms has established a good rapport with state and local law enforcement agencies. He's had the opportunity to travel to many of the National Wildlife Refuges in North Carolina, gaining vital knowledge from resident officers.

Throughout the year, Officer Simms assisted local law enforcement agencies on several occasions. These activities included boating accident investigations, search and rescue, lifesaving response and arson.

Officer Simms routinely patrolled Pocosin Lakes NWR and, with the assistance of Officer Smith, he apprehended five individuals for hunting waterfowl with bait.

Officer Simms assisted with three details at Cedar Island NWR, locating and conducting surveillance on a pond baited for waterfowl adjacent the refuge.

He also assisted with two waterfowl details at Mattamuskeet NWR and traveled with Officer Smith on five occasions to Cedar Island. There, the two officers conducted follow-up investigations and surveillance for ongoing cases.

The following figures represent the case breakdown for violations during 2007. This table includes written warnings that were issued for minor infractions, such as dogs off-leash. This table does not include verbal warnings or warnings given by other officers.

50 CFR Violation	Description	Number of Cases
50 CFR 28.31	Violating Rule, Provision or Sign	11
50 CFR 26.21	Trespassing	0
	Written Warnings	63
50 CFR27.94(a)	Littering	5
50 CFR 32	Hunting Violations	22
50 CFR 27.41	Weapons Violations	3
50 CFR 32.2(d)	Illegal Take (Animals)	5
50 CFR 32.2(h)	Baiting	0
50 CFR 28.31	Public Nudity	4

18. Cooperating Associations

Coastal Wildlife Refuge Society
The Coastal Wildlife Refuge Society (CWRS) is the primary cooperating association and friends group for both Alligator River and Pea Island National Wildlife Refuges. The Society also provides guidance and support for other refuges in North Carolina and serves as a mentoring organization for the fledgling friends groups at Mackay Island and Pocosin Lakes.

Primary sources of income for CWRS are refuge canoe tours (both refuges) and the book store/gift shop at the Pea Island Visitor Center. For more information about income via retail sales, see Section H-18 in the Pea Island NWR ANR.

The Coastal Wildlife Refuge Society was extremely active beginning late 2007. There was almost a complete turn-over on the Board of Directors, with Bucket Taylor taking the lead as president mid-year when Tom White, Dru Ferrence, Carol Slayton and Bill Ackiss stepped down. Bucket joined the board early in 2007 and stepped up as president several months later, when Tom White resigned.

Other new board members included Joyce Bornfriend, Gail Dreis and Stanley Oliver.

One issue with the former board involved the need for greater attention to membership. The new board immediately focused on updating and building membership, with a prioritized commitment to member care. Stanley Oliver accepted the lead in this initiative.

The 2007 focus projects for the CWRS were the construction of a boardwalk on Creef Cut Trail and the enlargement of the parking lot and installation of a floating dock at Upper Milltail. See section I-1 for details.

I. EQUIPMENT AND FACILITIES

1. New Construction

- Completed construction of an earthen pad at the south end of South Twiford Management Unit D. Construction provides staff access for mobilization, maintenance and fueling of portable pumps used for impoundment water management of the ninety-acre unit. Using excavated material from the existing canal, the pad was elevated four feet above the previous field level.

The 2007 focus projects for Visitor Services were the boardwalk construction on Creef Cut Trail, as well as the parking lot expansion and addition of a floating dock at Upper Milltail.

Creef Cut Boardwalk Construction

The refuge partnered with the Coastal Wildlife Refuge Society and National Recreation Trails Program for funding, and with NPS for engineering, contracting and oversight of the project.

The project included the following:

- Coordinated with USA-COE, CAMA, DWQ and FWS-ES
- Constructed 587 linear feet of 6' wide boardwalk (fully ADA compliant)
- Purchased 100,000 copies of revised Kuralt leaflet
- Purchased and installed 16 interpretive panels with frames
- In-kind match included over $5,000 in volunteer hours (mostly for routing 1600 feet of railing)

Funding sources for the project included:

- $5,000 FWS- Rec Fee Demo
- $44,500 Coastal Wildlife Refuge Society (includes a $32,250 grant from National Recreational Trails Program)

CWRS contracted with Jeff Harris to build the boardwalk from Engelhard, NC. Without Jeff's involvement, the project would not have been possible. Just a couple of weeks after the boardwalk was completed, Jeff passed away. For many of us, this boardwalk will serve as a constant memorial to Mr. Harris.

Jeff Harris, contractor for the Creef Cut Boardwalk, stands in the foreground of the final phase of construction. Just a couple of weeks after the boardwalk was completed, Jeff passed away. For many of us, this boardwalk will serve as a constant memorial to Jeff Harris. GG

<u>Upper Milltail Parking Lot Expansion and Floating Dock</u>

Paddling use at the Upper Milltail put-in has increased over the past few years, and the refuge identified a need to provide additional parking and a safer way for kayakers to get into their

boats. The existing "ramp" was quite steep, and the water adjacent to the ramp is quite deep. Whereas a canoe could be shoved into the water, then pulled with its side to the "bank", getting into and out of a kayak proved to be much more difficult. Basically, if a paddler launched in the normal way, the bow of the kayak would begin to float while the stern was still quite high on the bank. This created a 12-30" space under the paddler, which often caused the boat to flip. We realized that adding a safer way to launch a kayak would increase the need for parking.

Because the Federal Highways folks removed the guardrail when they built the new bridge over Milltail Creek, and subsequently required its replacement, we were able to get a USACOE permit to build an "access road" to the existing parking lot. This construction functionally increased the size of the existing parking area by .25 acre.

We opted to purchase a small floating dock from Jet-Dock and anchor it adjacent to the existing ramp.

Funding for the Upper Milltail Project came from the following:

- Facilities Enhancement Funds (MMS/RONS) - $10,000- (gravel, fill, pre-fab dock and gangway).
- CWRS - $5,000 (mitigation bank, permit fees, contractor for installation).

2. Rehabilitation

- Continued efforts, as needed, to remove downed trees from refuge roads. Previous hurricane and wind events have created an on-going problem with falling trees. Downed trees were removed from the following roads this year: Hook, Long Curve and Osprey, Laurel Bay, Possum, Koehring, Alligator and Whipping Creek. Clearing canal access to several popular public-use waterways, including Whipping Creek, Swan Lake and Laurel Bay Lake, has not been fully completed.

3. Major Maintenance

Deferred Maintenance Projects:

- Completed SAMMS Deferred Maintenance project # 98102755 (rehabilitate primary canal system). Accumulated storm debris from several years of storm events had plugged the canals, restricting water flow and flooding areas, including portions of the East Lake community. Approximately 40 miles of refuge road canals were cleaned out.
- Completed SAMMS Deferred Maintenance project # 98102788 (rehabilitate refuge gate system). Approximately 15 pipe gates were rehabbed or constructed to provide more adequate access security to the refuge farm fields and several roads outside the farm units.
- Completed SAMMS Deferred Maintenance project # 98102788 (rehabilitate Creef Cut Trail). The existing boardwalk was modified and extended in length.
- Completed SAMMS Deferred Maintenance project # 98102788 (rehabilitate Milltail Creek Boat lunch area). The existing boat launch was widened and a floating dock with aluminum walkway was installed.

Other Major Maintenance included:

- Repairs or service to a cumulative total of fifty-five (55) over-the-road vehicles and one-hundred-and-one (101) pieces of equipment, including light and heavy-duty mobile equipment, boats, mowers, ATVs, etc.
- Ongoing road maintenance:
    1. Stockpiling of fill material for road repairs.
    2. Grading a cumulative total of three-hundred-eighty-six (386) miles of refuge roadway.
    3. hauling and spreading fill material on Bear, Blueberry, Bobcat, Brier Hall, Butler, Cedar, Deep Bay, Grouse, Laurel Bay, Osprey, Pollock, Possum, Pump, River and Sawyer Lake Roads (Materials were also hauled and spread on dikes used for vehicular access around the four (4) North Twiford Management Units).
    4. mowing and / or boom-axing canal banks and road shoulders along Bear, Blueberry, Bobcat, Borrow Pit, Brier Hall, Butler, Cedar, Creef, Deep Bay, Dry Ridge North, Gadwall, Grassy Patch, Grouse, H&B, Hook, Koehring, Laurel Bay, Link, Long Curve, Milltail, Peterson, Pollock, Possum, Pump, River, Sandy Ridge, Sassafras, Sawyer Lake, West Widgeon and Wynn Roads.
- Additional mowing and / or boom-axing was done on:
    1. Field / impoundment V-ditches in: Creef A1 and A2 impoundments; South Twiford Units A, B and C.
    2. Field portions of corn and grasses left in impoundments for migratory bird use.
- Water management efforts included:
    1. Seasonal water management of all impoundment units using water control structures, gravity water flow and portable pumps to meet management objectives.
    2. Ongoing pumping of farm / management units to facilitate cooperative farming operations and meet other management objectives (Water management and pumping of the refuge farming / management units is divided between two pump stations. The Creef pump station pumps all farm fields, impoundments, wooded blocks and filter strips. These are inside the outer perimeter dikes of the Creef Management Unit (east of Milltail Road), and include the Dare County fields, for a total of **3,872** acres. The Laurel Bay pump station pumps all farm fields, impoundments, wooded blocks and filter strips (inside the outer perimeter dikes) of the Laurel Bay and Twiford Management Units (west of Milltail Road), for a total of **3,497** acres. Each of the two pump stations are equipped with two 48" right-angle, gear- driven pumps. CAT diesel engines provide the power to the pumps. In 2006, at the Creef pump station, Engine 1 ran 1,873 hours and Engine 2 ran 1,401 hours, totaling 3,274 hours. At the Laurel Bay pump station, Engine 1 ran 2,245 hours and Engine 2 ran 4,427 hours, totaling **6,672** hours. Above-average amounts of rainfall for the year (61.76 in.) dictated the combined total of 9,946 hours of pumping at both stations. Each engine has a fuel consumption rate of 2.5 gallons per hour. Multiplying the total number of gallons by the fuel consumption rate, the pump engines burned **24,865** gallons of fuel. Using an

average cost of $2.35 per gallon for diesel fuel, the cooperative farmers spent **$54,432.75** for fuel. The routine service interval for each of the four (4) engines occurred every 250 hours. Total hours divided by service intervals (9,946 divided by 250) amounted to 40 service routines completed on the units. At $85.00 per service (filters & oil), this totaled $3,400.00 (refuge costs for oil & filters) for the year, not including staff salaries, or any additional repairs to the units).

- Beaver dams in canals along refuge roads continue to be a problem. Clean out of the canals and culverts requires mobilization of an excavator each time.
- Ongoing cleaning of debris from farm field water control structures and culverts is required to allow sufficient drainage and water control.
- Assistance with the spraying of invasive plants (alligator weed and phragmites) was provided.

4. Equipment Utilization and Replacement

Fire Equipment:

New Equipment: A new IA Dozer (Caterpillar D6K) was funded in 2007 and purchased. Delivery is expected in 2008. A new six-passenger diesel crew support truck was purchased in 2006 and delivered in 2007. FCO Harris helped Mackay Island NWR order a new wildland fire engine from RKO Industries. Delivery is expected in early 2008.

IA Taskforce: ARNWR has the capability of fielding two flex-tracked fire tractors, a portable bridge and heavy dozer with which to set the bridge, and one Type-6 fire engine for Initial Action Response. A second engine can be put into service within minutes following a call-out.

Support Equipment: For prescribed burning and wildland fire support, we can field one Marsh Master, one full-tracked fire tractor (off-road tracked engine with Terra Torch), and numerous boats. However, we do not have adequate staffing to field these support vehicles at the same time as the IA taskforce.

Propane heaters were installed to heat the engine bays and fire cache.

The Geo-Boy brush cutter tractor was sent to the manufacturer, Jarraff Industries, Inc., for rehabilitation after a vandal drove the machine into a canal. It was immersed in the acidic canal water almost to the top of the roof. Under the direction of mechanics from Jarraff Industries, fire staff drained and dried the machine as much as possible. They managed to get the engine running before it was shipped to Minnesota for a re-haul. Shipping and repair costs were $23,000, in addition to the amount the refuge spent to extract the machine and get it running again. The Geo-Boy was completely overhauled, replacing all electrical wiring and electronics. It was delivered back to the refuge on February 26, 2007. Since its return, it has been used for over 200 hours, with no apparent problems resulting from its previous immersion.

A salvage company brought a diver and crane to recover the $240,000 Geo-Boy from the canal.
DH

6. Computer Systems

In 2005, Alligator River saw a change in IT support. Office of Migratory Birds employee, Buddy Jones, took a new position, which reduced the support he could supply to our office. FT Van Druten was assigned IT point-of-contact for the station.

Time was spent in 2007 keeping Lotus Notes running on all computers. Between new users, computer crashes and lost or out-of-date passwords, computer servicing was done approximately 18 times in 2007. A major exercise was conducted to get all refuge laptops (14) encrypted in December. Various types of technical support were given to all program areas, including the reinstallation of operating systems; correction of password problems; maintenance of printers; addition of units to the network; installation of software; maintenance of staff Lotus Notes; updates of anti-virus software; resolution of computer crashes due to viruses; activation of new computers for users; and installation of hardware.

In June, 2005, new servers were installed for both the Red Wolf Recovery Program and the Manteo office. This provided additional capacity for back-ups and data storage. This year we also ran into capacity issues with the Manteo office server. An 80-GB external hard drive was added, but issues with capacity continue due to the number of people backed up to this server. There are plans to add a larger external hard drive in 2008.

The Skycaster satellite internet service at the Maintenance Facility was challenged with capacity issues in 2007. The service has been 'throttling' our usage (reducing speed) because we go over our monthly download limit. The cause of the excess downloads appears to be heavier Internet use for databases such as SAMMS. Hopefully, we can find a solution in 2008.

8. Other

- Assisted with prescribed burning efforts at Alligator River, Pea Island, Pocosin Lakes, Mackay Island and Cedar Island refuges.
- Assisted with the Evans Road wildfire on Pocosin Lakes NWR.
- Assisted Great Dismal Swamp NWR with wildfire initial attack and suppression.
- MW Powers and EEO Govan accomplished pack test requirements for arduous level fire duties and attended the annual "Standards for Survival" training.
- EEO Govan attended training to become a Regional Heavy Equipment Safety Training instructor.
- Completed SAMMS, RONS, RCAR, RPI, OGM, Fleet Management, and Capitalized Property database requirements; FY 07 SAMMS reports completed and closed out; FY 08 opened for entries (Efforts to reach full level of SAMMS implementation required four (4) staff members to maintain program requirements).
- Coordinated exchanges of equipment (and personnel, as needed) with Mattamuskeet, Pocosin Lakes, Roanoke River, Mackay Island, Pee Dee Refuges, Navy Dare Bombing Range (DOD) and Cape Hatteras National Seashore (NPS) (These exchanges were coordinated by the maintenance staff).
- Participated in a series of Federal Highway Administration road assessments and planning processes.
- Made appropriate preparations for hurricane season (Preparations were carried out by both volunteers and staff members).
- Participated in Regional Environmental Safety audit.

J. OTHER ITEMS

1. Cooperative Programs

Black Bear Study

A proposal to conduct research on the black bear and red wolf was submitted to the NC Department of Transportation in December, 2006. The proposed research relates to the pending upgrade of US Highway 64 from a two to four-lane roadway, and the possible impact this expansion might have on the two species. The basic purposes of this study are to collect baseline data on populations and habitat use before project construction; provide a database for the incorporation of design features into the project design during the early planning phases; and monitor impact on wildlife during and after construction. Because the project is still in the early planning stages, most of the activity for the upcoming year will center around planning meetings. During 2007, joint team meetings and meetings regarding the research proposal were attended. Little else has been undertaken on this project.

The Refuge Biologist frequently coordinates with the North Carolina Wildlife Resources Commission (NCWRC) on various projects. For example, we assist with the collection of data regarding road-kills of black bears, and we provide the data to the appropriate NCWRC staff personnel. We also coordinate waterfowl surveys.

Climate Change

Considerable time was expended on meeting and coordinating with other government agencies, universities and non-government conservation organizations to plan for adaptive management on the refuge in the face of climate change, as manifested by rising sea levels. While the rate of inundation due to rising sea levels may be a constant, the rate of habitat change on the refuge seems to be occurring faster than in other areas. This may be due to the interaction of high-salinity water and peat soils. By working with partners, the refuge is hoping to adaptively manage habitat under a strategic plan, even as sea levels rise.

4. Credits

This Annual Narrative Report was a joint effort by the refuge staff, with compilation by OA Adam Fauth and editing by volunteer Tess Critzer and VSM Bonnie Strawser.

Photo Credits:

BC	Bruce Creef
BS	Bonnie Strawser
CW	Cory Waters
DH	Donnie Harris
DS	Dennis Stewart
FWS	Fish & Wildlife Service
GG	George Gentry
GK	Greg Koch
KV	Kelley Van Druten
MHGM	Mary Helen Goodloe-Murphy
PDZA	Point Defiance Zoo & Aquarium
RN	Ryan Nordsven

INTRODUCTION

Pea Island National Wildlife Refuge is a 5,915-acre, ocean-bound tract at the northern end of Hatteras Island. It is part of a chain of islands known as the Outer Banks of North Carolina. Formerly established as the Pea Island Migratory Waterfowl Refuge, the area was designated "a refuge and breeding ground for migratory birds and other wildlife" by Executive Order 7864, signed by President Franklin D. Roosevelt on April 8, 1938. On May 11, 1938, Presidential Proclamation No. 2284 also granted federal protection to 25,700 acres of the adjacent Pamlico Sound, closing those waters to all hunting of migratory waterfowl.

Pea Island, and the other dynamic and ever-changing barrier islands of North Carolina, are separated from the mainland by a series of marshes and sounds which range from very narrow to 25 miles in width. Officially un-staffed and unfunded, Pea Island is managed by staff from Alligator River NWR.

Pea Island's climate is generally moderated by the ocean, making it cooler than the mainland in summer and warmer in winter. During summer, southwest winds bring warm, humid air followed by cool, damp northeast winds. These frequently reach 20-30 M.P.H. during fall and winter. Tropical storms, hurricanes and 'nor'easters' are not uncommon.

Refuge habitat types include ocean beach, barrier dune, sand ridge, brush and grassland, salt marsh and salt flats. Three impoundments covering 790 acres are managed for food production, to provide forage for waterfowl and shorebirds. Prescribed burning is conducted in marshes and impoundments to enhance wildlife habitat and maintain a healthy ecosystem.

The diversity and abundance of birds on Pea Island has made it a 'birders' paradise.' A total of 365 bird species have been spotted on the refuge, which serves as an important wintering ground for tundra swans, snow geese, and more than 25 species of ducks. During spring and fall migration, shorebirds are abundant. Piping plovers use the refuge beaches for feeding and, less frequently, for nesting. During summer months, a modest number of loggerhead sea turtles also lumber onto the beaches to begin their nesting rituals. Other species of wildlife include a host of mammals, fish, reptiles and crustaceans.

Public use at Pea Island is centered around the Visitor Center, North Pond Trail and the island's undeveloped beaches. Each of these areas provides opportunities for excellent wildlife viewing. More than two million people pass through the refuge annually, entering along NC Highway 12. The Coastal Wildlife Refuge Society (refuge support group) operates a sales area in the Visitor Center and provides critical financial support for interpretive and educational programs. The refuge also has a very active volunteer program.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 2007

U. S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

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A. HIGHLIGHTS

The Bonner Bridge Replacement Project is still unresolved. (Section D-4)

A portable pump was installed at South Pond to increase water management capabilities. (Section F-2)

The refuge received a Volunteers and Invasives Grant to purchase herbicide and safety equipment for volunteers to help combat the Phragmites problem on Pea Island. (Section F-10)

Fourteen sea turtle nests produced 1390 hatchlings. (Section G-2)

Waterfowl numbers peaked at 32,346 in mid-December. (Section G-3)

Total visitation to Pea Island in 2007 reached approximately 1.5 million. (Section H-1)

Programs conducted on the refuge were presented to 2,894 visitors. (Section H-7)

The Annual Crabbing Rodeo drew approximately 1000 participants. (Section H-9)

B. CLIMATIC CONDITIONS

Specific climatic data is not kept for Pea Island NWR. See Alligator River National Wildlife Refuge narrative section B for local data.

C. LAND ACQUISITION

2. Easements

The ongoing effort to keep NC Highway 12 open for traffic continued in 2007. Although there were no changes in the right-of-way easement, much effort went into working with the NC Department of Transportation (NCDOT) to keep sand and water off the highway with each passing storm. Although hurricanes caused few problems, northeasters and remnants of tropical systems caused ocean over-wash on a few occasions. Most of the post-Hurricane Isabel dunes in the Canal Zone Hotspot were severely eroded by a northeaster on May 5-6, and reconstruction efforts lasted through July. Most of the work was permitted outside of the right-of-way.

D. PLANNING

1. Master Plan

The Comprehensive Conservation Plan and Environment Assessment were completed in 2006.

4. Compliance with Environmental and Cultural Resource Mandates

NC Highway 12
Road work completed after storms was performed under environmental documentation by the NC Department of Transportation through provisions of the National Environmental Policy Act, and under the terms and conditions of the Right-of-Way Permit. Special Use Permits were issued to reinforce dunes outside the right-of-way. Dune reinforcement included rebuilding, use of sand fencing and sprigging with native plant species.

Bonner Bridge

RM Bryant continued meeting with NCDOT and various other state and federal agencies, as well as non-government organizations. They discussed alternatives for maintaining Hwy 12 through Pea Island NWR in the event that a short bridge is built to replace the Bonner Bridge over Oregon Inlet. The NCDOT released a Supplemental Draft Environmental Impact Statement (SDEIS) in the fall of 2006. Alternatives evaluated in the SDEIS included (1) road-at-grade within the existing ROW (Right-of-way), with beach nourishment to mitigate erosion; (2) a combination of additional short bridges and road-at-grade through the refuge west of the existing ROW; and (3) a combination of bridging on the northern end of the refuge and a road west of the existing alignment on the southern end of the refuge, excluding the Rodanthe area. All of the

short (parallel) bridge alternatives included an approximate three-mile road relocation and bridge at Rodanthe.

NCDOT was compelled to study each of these alternatives in detail in order to answer concerns about access. These concerns were raised by elected and appointed officials from Dare County. After completion of the NEPA review, State Senator Marc Basnight and his staff prepared an additional alternative, locally referred to as the "balanced approach" alternative. The Senator's proposal called for the construction of a parallel (short) bridge over Oregon Inlet, while maintaining the existing right-of-way. Bridging over the hot spots would occur in the future on an "as needed" basis, and temporary detours would be constructed while the hot spot bridges were under construction. The "balanced approach" alternative was not subjected to a cost analysis. It was not compared with other alternatives, nor was it a part of the NEPA review. NCDOT incorporated it into their NEPA disclosure process as the "Phased Approach," disclosing its details in a secondary supplement of the Supplemental Draft Environmental Impact Statement.

USFWS Perspective: The U.S. Fish and Wildlife Service is committed to maintaining the ecological integrity of Pea Island NWR and ensuring long-term public access. All short bridge alternatives, including various combinations, have far greater impact on habitat for migratory birds and other wildlife and will materially detract from, or interfere with, the "wildlife first" mission of Pea Island NWR. A short bridge alone would not address the major issue of maintaining NC Highway 12 through the refuge on a long-term basis. It is not likely that any of the short bridge alternatives would be compatible with our mission; therefore, it is unlikely that a permit would be issued for right-of-way modifications or a new right-of-way.

The Pamlico Sound Bridge Alternative (Long Bridge) would reduce long-term maintenance costs, improve safety and reliability, and cause less environmental impact. While the long bridge may initially cost more than a short bridge, the long bridge would effectively eliminate the need for expensive maintenance on NC Highway 12 as it passes through the refuge. This would result in large cost savings to NCDOT over the long term. A bridge in Pamlico Sound is the better long-term solution for the refuge and the public.

The U.S. Fish and Wildlife Service supports a safe, long-term, reliable transportation corridor that would have the least impact on refuge land. The NEPA merger team allows the refuge manager to be actively involved in the selection process. The U.S. Fish and Wildlife Service is committed to working with others to ensure public access to the refuge and to evaluate permit applications for the groin.

As in previous years, several pages of text could easily be written summarizing the activities and actions associated with the replacement of the Bonner Bridge, dredged material disposal on the refuge beach, and dune reconstruction and maintenance along NC Highway 12. Throughout the year, refuge staff participated in numerous meetings with USCOE, NCDOT, ES, other state agencies and local officials. These aforementioned issues will persist due to the proximity of the refuge to Oregon Inlet, the need to replace the existing Bonner Bridge, the presence of NC Highway 12 (the only road serving seven villages south of Nags Head), and the strong political influence of Outer Banks politicians.

S-Curve Sandbags – The refuge issued a Special Use Permit authorizing NCDOT to place sandbags along an approximate 1000-foot section of refuge beach for protection of the NC Highway 12 roadbed. A Thanksgiving northeaster severely eroded the beach and a portion of the highway. The sandbags are a temporary measure until NCDOT can finalize plans for the Bonner Bridge replacement project, which will provide a long-term solution to highway problems in this area.

5. Research and Investigations

Oregon Inlet Dredging

Refuge staff continued data collection along refuge beaches this year as part of the monitoring plan examining effects of USACE (United States Army Corp of Engineers) disposal of dredge material. The USACE planned to dredge 1,500,000 cubic yards of material from the Oregon Inlet Navigation Channel adjacent to and including the Bodie Island spit and the Outer Ocean Bar portion of the channel. However, available funding was insufficient for the USACE to issue a contract for dredging the Bodie Island Spit by pipeline dredge and hydraulically placing the material south of Oregon Inlet on the refuge beach. The inlet channel was maintained by a side-cast dredge and a small hopper dredge (Currituck). Volume and placement with these two dredges are unknown. Considerable time was required to prepare the Special Use Permit for the pipeline dredging project.

Even in the absence of sand bypassing in 2007, sediment sampling, along with beach slope, scarp formation and faunal data, will continue to be collected along transect lines. In addition, sand compaction (psi) will continue to be measured with a cone penetrometer prior to and after dredge material disposal. Identifying environmental conditions that influence faunal numbers will assist in evaluating effects directly associated with nourishment, as well as recovery rates for the beach. All data and samples from the 2007 sampling cycle, etc., were delivered to Coastal Research Associates (CRA) for analysis and reporting. Coastal Research Associates was issued a contract for this project using USACE transfer funds.

Coastal Research Associates continued to work under the five-year contract as a professional representative for the FWS on the NCDOT Groin Monitoring Team and for the purpose of monitoring impacts and recovery resulting from beach disposal of dredged material. Dr. Robert Dolan will continue to provide professional level technical direction to the monitoring program.

Refuge personnel collected sand compaction readings and three to four sand samples at each turtle crawl to develop baseline data for use in developing special conditions for SUPs issued to USACE and NCDOT for beach nourishment.

6. Other

Following each relatively minor storm ranging from northeasters to offshore tropical storms, NCDOT was issued authorization to make emergency repairs on sections of damaged dune lines where normal high tides were inundating sections of NC Highway 12. The refuge authorized use of sand that had accumulated in berms on the west side of the highway for dune reconstruction.

An advantage to using this material is that it contains root-stock, seeds and rhizomes which facilitate re-vegetation. Permits authorized sand fencing to stabilize refurbished or reconstructed dunes along the highway.

GIS:

See the Alligator River NWR Section D-6 for information.

E. ADMINISTRATION

1. Personnel

See Alligator River NWR Annual Narrative Report

4. Volunteer program

From year to year, the daily operation of Pea Island depends heavily upon local and visiting volunteers, both individuals and work groups. The volunteer hosts and hostesses of the Visitor Center (which receives over 60,000 visitors annually) continued to represent Pea Island with friendly reception and helpful information.

Sea Turtle monitoring, through the programs of Turtle Patrol and Turtle Watch, was made possible by over 60 volunteers who donated more than 2,000 hours of their time.

Several coordinated work groups and individuals contributed to beach and roadside clean-ups, maintenance, biological assistance and special events.

6. Safety

Two ATV classes were taught at Pea Island NWR on May 23rd and 24th, 2007, by refuge instructor FT Van Druten. A total of 11 students were taught in 2007. The classes included employees from two refuges, volunteers and interns involved primarily with the Sea Turtle Nesting Program on Pea Island NWR. A total of 89 students have been instructed since 2005 at either Alligator River or Pea Island NWR's.

F. HABITAT MANAGEMENT

1. General

Pea Island NWR, a section of a coastal barrier island, consists of several basic habitat types. The table below presents results of the most recent mapping exercise with regard to habitat type, land use and acreages. This table resulted from preparation of the Comprehensive Conservation Plan. Due to prescribed fire, some cover types are in a transitional stage between shrub and grassland/marsh. Beach and dune acreages change from year to year.

The original acreage for Pea Island NWR was 5,915. Oregon Inlet dredging, Bonner Bridge and NC Highway 12 maintenance and protection have influenced the loss of acreage by subduing and altering natural processes such as over-wash.

Habitat Types and Land Use -2007

Habitat Type/Land Use	Approximate Acreage
Impoundment	790
Ocean beach	220
Ocean over-wash impact area	23
Mitigation site	27
Terminal groin & impact area	55
Dike	52
Transitional (fire)	50
Sound-side islands	264
Estuarine ponds	41
Estuarine salt flats	136
Emergent marsh	1,373
Sand ridge	183
Maritime shrub	650
Palustrine marsh	184
Palustrine grassland	28
Barrier dune	448
Reconstructed dune	71
Parking lots & structures	8
NC 12 ROW and paved road	203
TOTAL	**4,806**
Open water (Proclamation area)	25,700

2. Wetlands

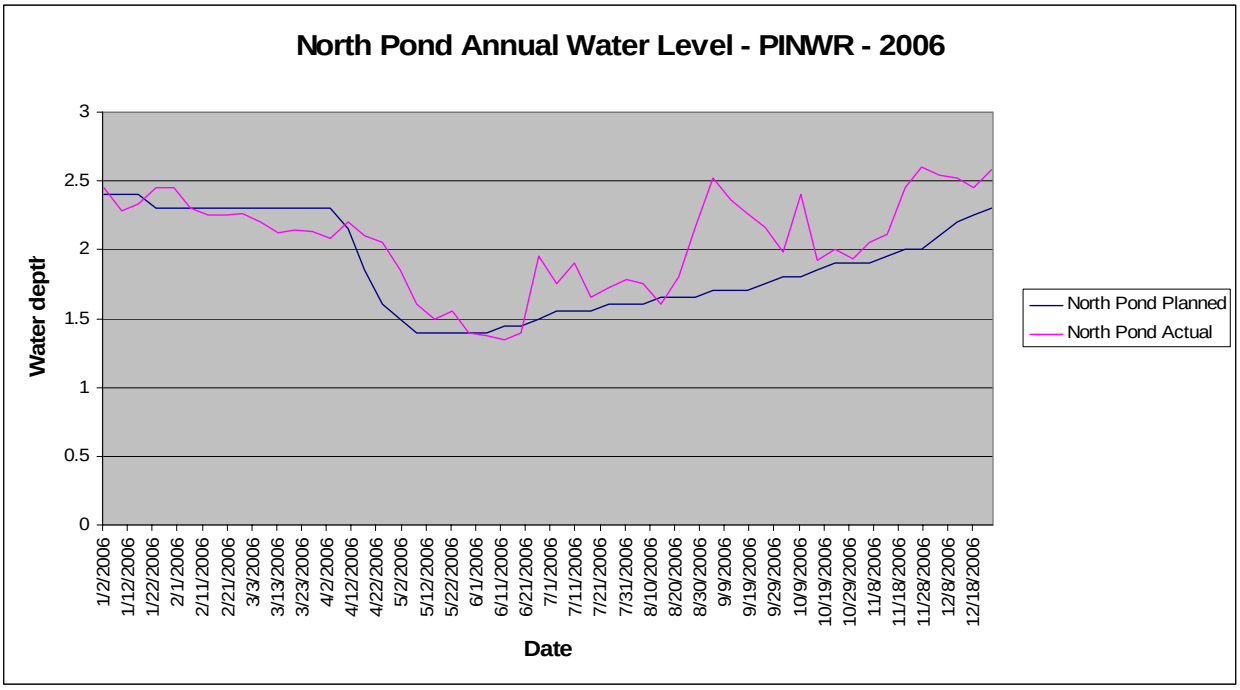
Wetland management on the refuge focuses on three man-made impoundments. They are North Pond (397 acres), New Field Pond (320 acres), and South Pond (223 acres). These impoundments are managed primarily for submerged aquatic vegetation (SAV) production to provide high quality habitat for wintering waterfowl. Over time, management strategies have evolved to accommodate near optimum habitat conditions during peak migratory periods for shorebirds.

Most of North Carolina experienced a severe drought during the summer and fall of 2007, which impacted water management in the impoundments. A portable pump, purchased through an NAWCA (North American Wetlands Conservation Act) grant for South Pond, was installed, and this improved water management capabilities greatly. A great deal of pumping was done throughout the summer. Water available for pumping had a higher-than-normal salinity (20 – 30 ppt) due to the drought, which impacted salinity levels within the impoundments. A tradeoff between keeping the vegetation submerged versus having higher salinity levels was managed as well as possible, given the drought conditions.

North Pond

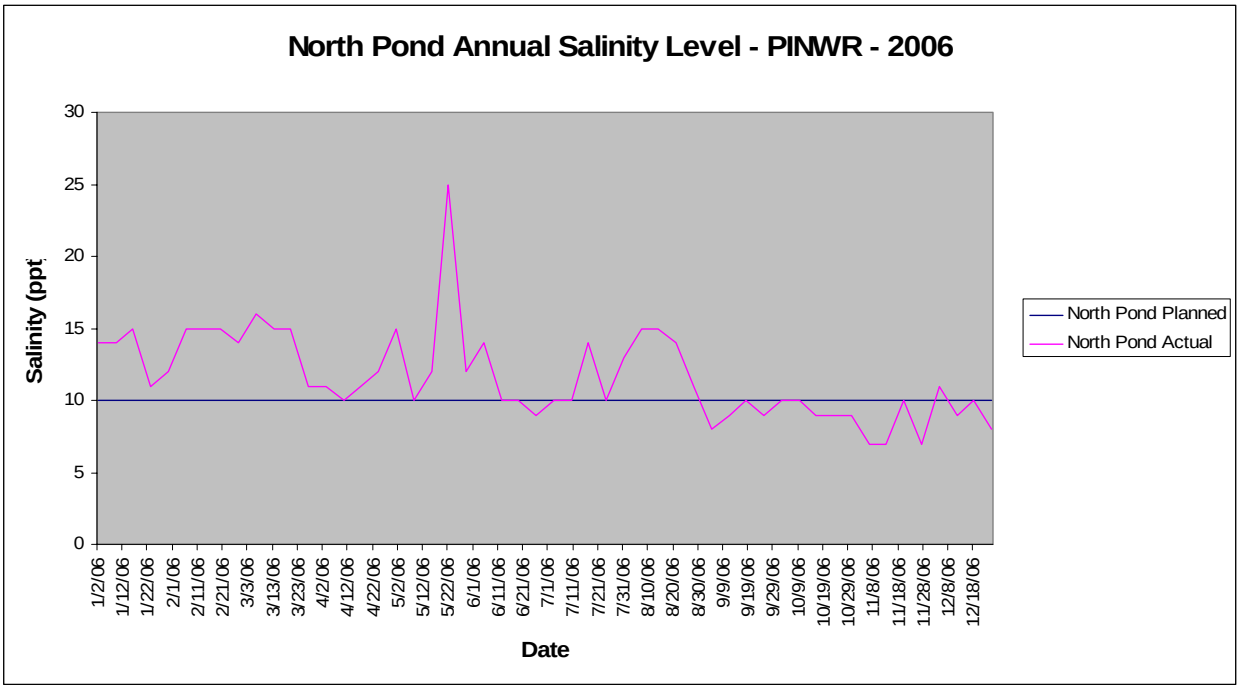
Water management in North Pond was on-target throughout most of the year. Average annual deviation from planned water level was 0.20 feet. This close adherence to the planned water level resulted in nearly ideal conditions for SAV and invertebrate production. Figure ***F-2-1*** provides insight into water level variation during the course of the year.

Figure ***F-2-1***: Seasonal fluctuations in water level in North Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.



Although salinity cannot be controlled except through prudent containment and release of water in conjunction with rainfall events, average annual salinity was only 1.7 ppt above the desired level. Average monthly salinity varied from about 7 ppt in the late fall, to a high of 25 ppt in May. Fall and winter salinity readings varied from about 7.8 -14.8 ppt. Figure ***F-2-2*** illustrates variation in salinity during the course of the year. A goal of 10 ppt was arbitrarily chosen for reference purposes. It is evident from these figures that, as water level drops due to evaporation, salinity increases.

Figure ***F-2-2***: Seasonal fluctuations in salinity (ppt) in North Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.

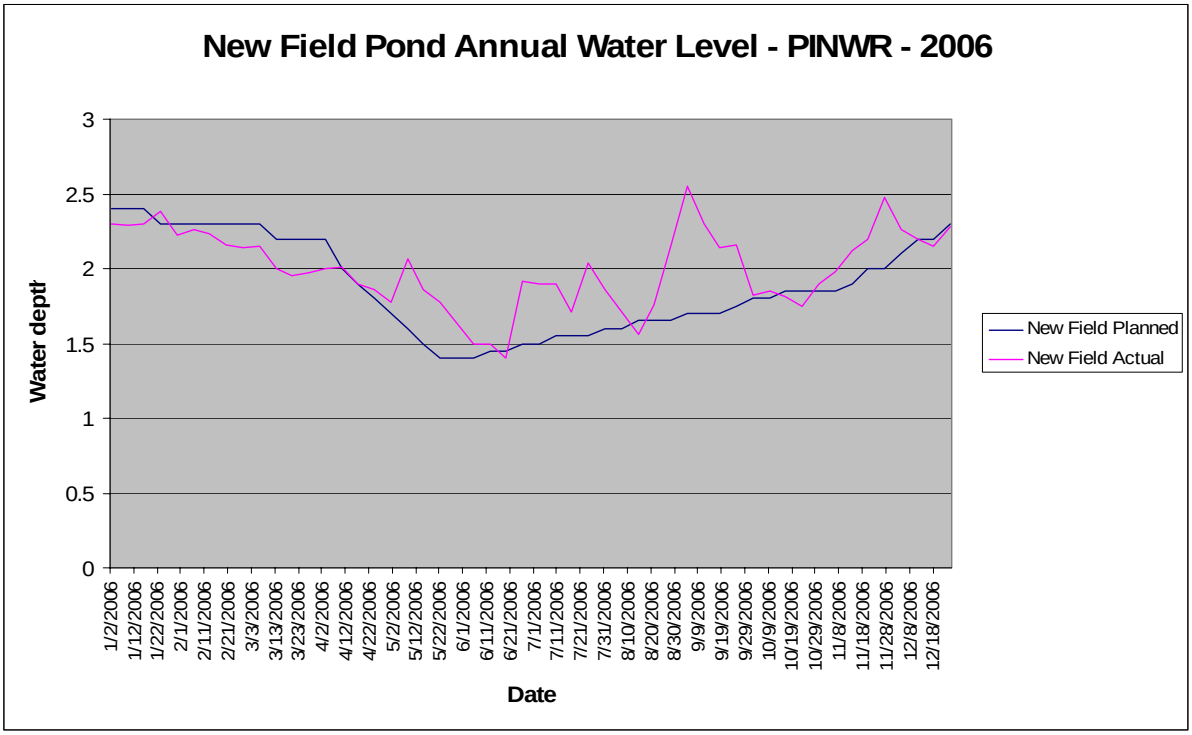


To compare plant food production for the 2006-2007 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2006. Plant species rated as good or fair waterfowl food were found on 81% of the transect plots. The remaining 19% of the plots consisted of bare ground (13.7%) or plant species with no food value for waterfowl (5.3%). *Chara* spp. (58.5%), widgeon grass (*Ruppia maritima*) (7.7%), and sago pondweed (*Potamogeton pectinatus*) (5.2%) dominated the "good" foods, and the "fair" category was dominated by salt meadow hay (*Spartina patens*) (7.7 %) and bacopa (*Bacopa* spp.)(1%). Overall, the data shows relatively good submerged aquatic production. It is interesting to note the marked decrease of "bare" plots (from 34% last year to 13.7% this year) after reduction of resident Canada geese, which were negatively impacting the availability of submerged aquatic vegetation for migratory waterfowl.

New Field Pond

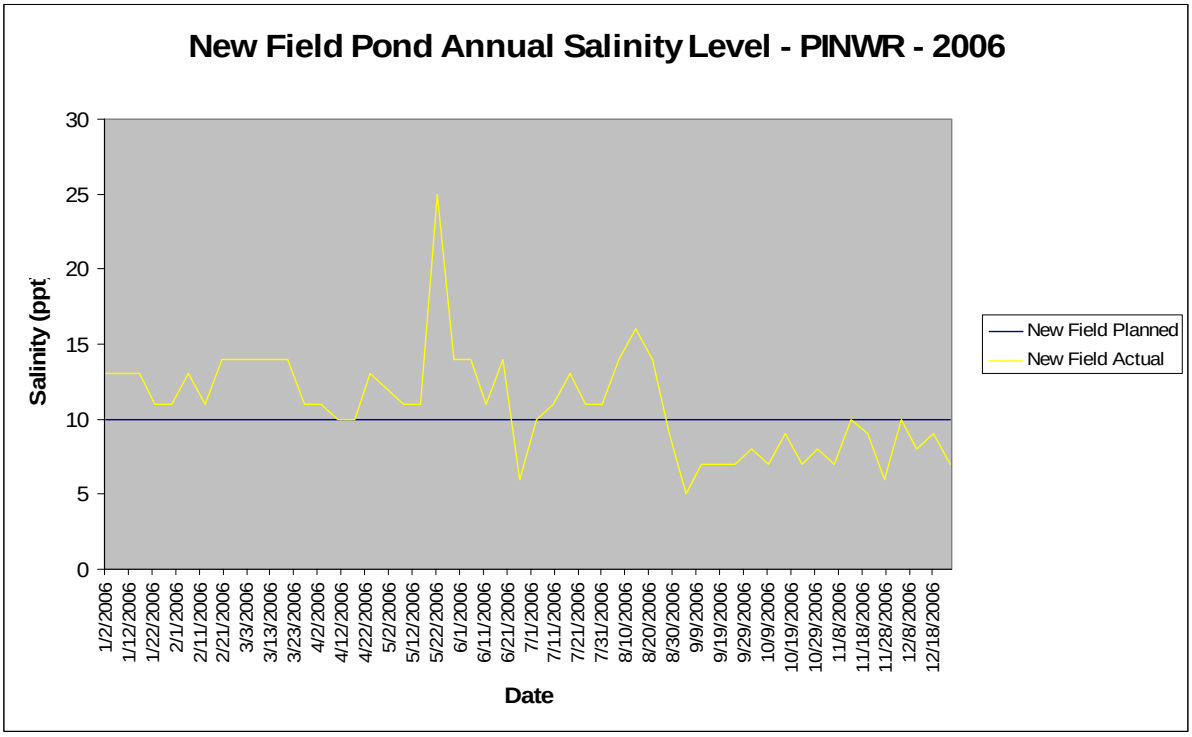
New Field Pond water management was on-target throughout most of the year. Average annual deviation from planned water level was 0.12 feet. This close adherence to the planned water level resulted in nearly ideal conditions for SAV and invertebrate production. Figure ***F-2-3*** provides insight into water level variation during the course of the year.

Figure ***F-2-3***: Seasonal fluctuations in water level in New Field Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.



Although salinity cannot be controlled except through prudent containment and release of water in conjunction with rainfall events, readings ranged from average monthly highs of around 14.6 ppt in May to average monthly lows of 6.5 ppt in September. Average monthly fall and winter salinity readings varied 8.0 – 13.0 ppt.

Figure ***F-2-4***: Seasonal fluctuations in salinity (ppt) in New Field Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.

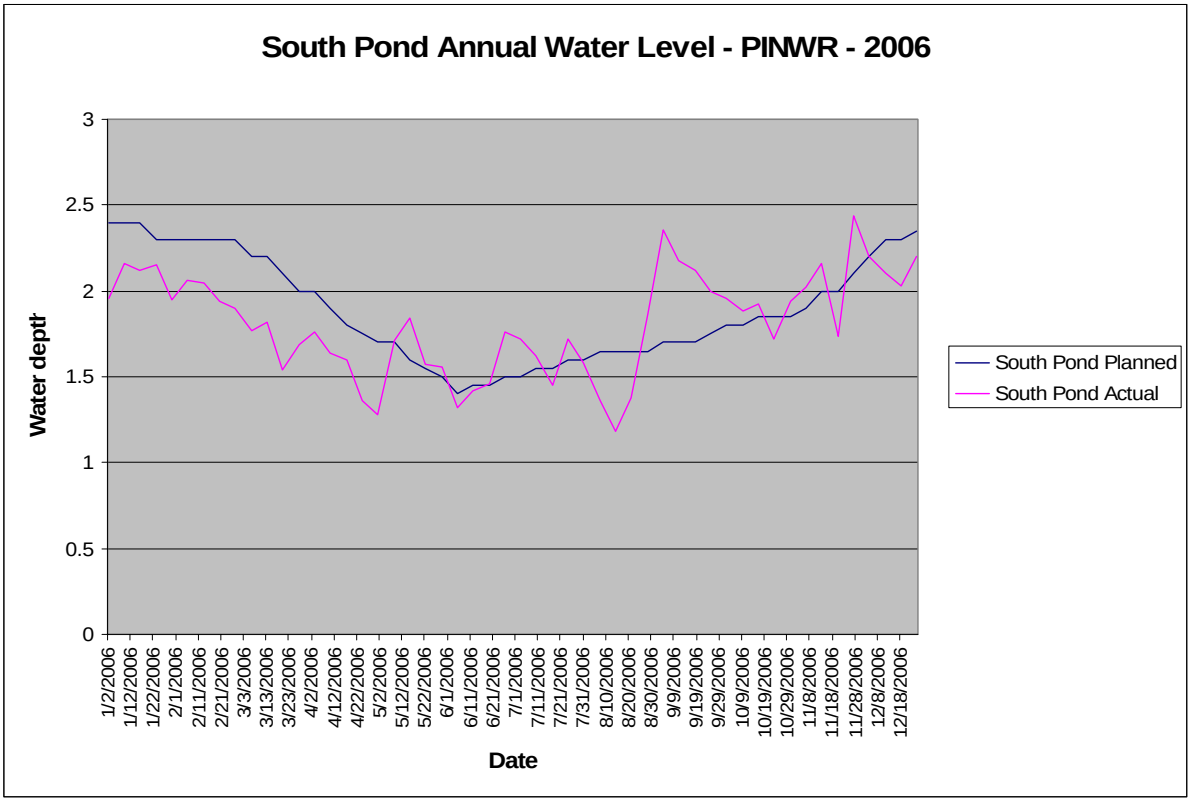


To compare plant food production for the 2006-2007 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2006. Plant species rated as good or fair waterfowl food were found on 85.9% of the transect plots. The remaining 14.1% of the plots consisted of bare ground (8.3%) or plant species of no food value for waterfowl (5.8%). *Chara* spp. (40.5%), sago pondweed (*Potamogeton pectinatus*) (7.3%), widgeon grass (*Ruppia maritima*) (4.0%), and giant rush (*Scirpus robustus*) (4.5) dominated the "good" foods and the "fair" category was dominated by salt meadow hay (*Spartina patens*) (23.2%) and salt grass (*Distichlis spicata*) (2.2%). Overall, the data shows relatively good submerged aquatic production. As with North Pond, it is interesting to note the marked decrease of "bare" plots (from 41% last year to 8.3% this year) after reduction of resident Canada geese. The geese were negatively impacting the availability of submerged aquatic vegetation for migratory waterfowl.

South Pond

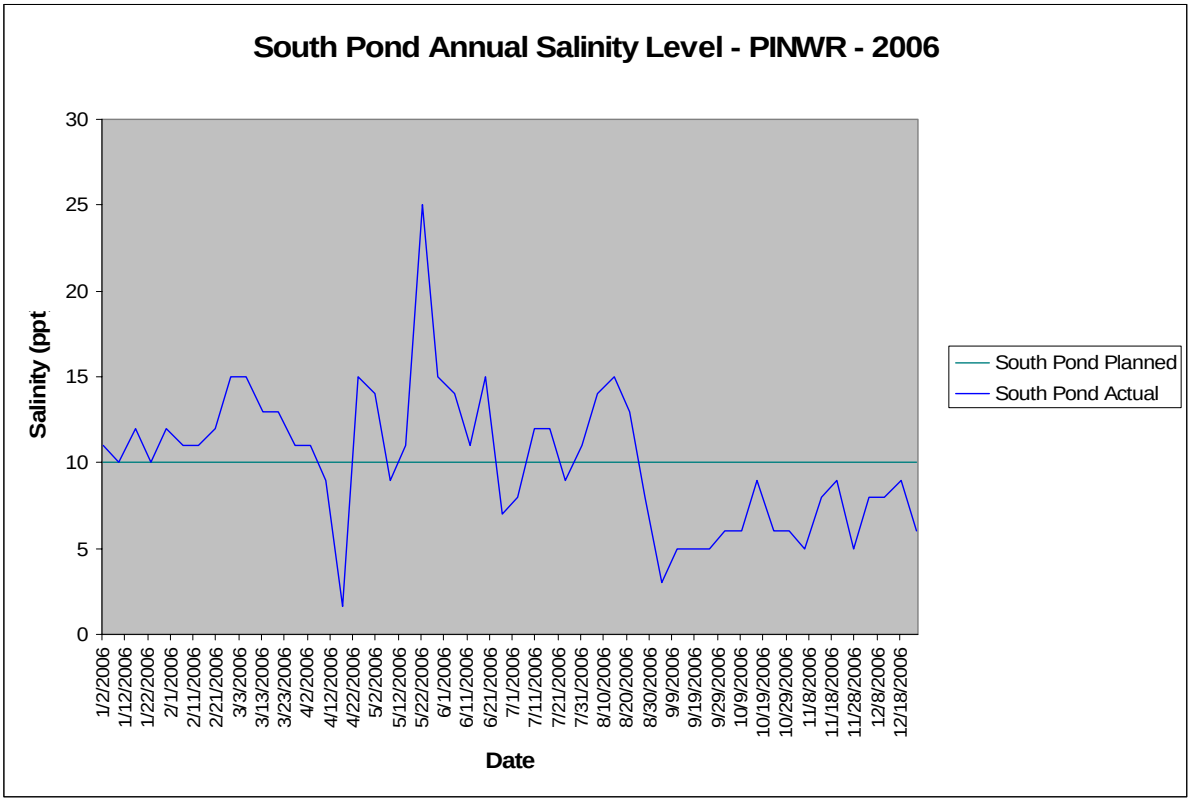
Because South Pond has limited water management capabilities, it is difficult to manage for SAV production, as we are dependent upon rainfall and above-average wind tide events for input into the system. However, the new portable pumping system enhanced our ability to maintain water levels in South Pond. As can be seen from Figure F-2-5, water levels were maintained to within an annual average of -0.09 feet of the planned elevation. Even though the water control structure began to develop significant leaks, SAV production was improved as compared with previous years.

Figure ***F-2-5***: Seasonal fluctuations in water level in South Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.



Although salinity cannot be controlled except through prudent containment and release of water in conjunction with rainfall events, readings ranged from average monthly highs of around 13-14 ppt in March – May, to average monthly lows of 4.5 – 6.0 ppt in September - October. Average monthly fall and winter salinity readings varied 7.8 – 14.8 ppt.

Figure ***F-2-6***: Seasonal fluctuations in salinity (ppt) in South Pond Impoundment at Pea Island National Wildlife Refuge during the 2006/07 monitoring period.



To compare plant food production for the 2006-2007 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2006. Plant species rated as good or fair waterfowl food were found on 73.7% of the transect plots The remaining 26.3% of the plots consisted of bare ground (19.3%) or plant species of no food value for waterfowl (7.0%). *Chara* spp. (51.1%), widgeon grass (*Ruppia maritima*) (8.7%) and sago pondweed (*Potamogeton pectinatus*) (3.5%), dominated the "good" foods. The "fair" category was dominated by salt meadow hay (*Spartina patens*) (3.9%). Improved production of submerged aquatic vegetation was achieved through the reduction of the resident Canada geese. These were negatively impacting SAV availability to migratory waterfowl.

Salt Flats

Wetlands in the Salt Flats are flooded and dewatered by natural ebb and flow in wind/tides and by rainfall/runoff. Vegetation has remained relatively unchanged for many years in this area. The predominant vegetation is glass wort (*Salicornia virginica*.), sea oxeye (*Borrichia* spp.), black-needle rush (*Juncus roemerianus*), salt-marsh cord grass (*Spartina alterniflora*), salt meadow hay and salt grass. Overall, 64.9% of the plants in sample plots are ranked as "fair" or "good" waterfowl food. In the plots sampled, 19.5% were "bare" due to salt concentration in the soil or open water. However, these areas produce large numbers of invertebrates due to tidal flooding with suitable wind or spring tides.

Mitigation Ponds

The two small mitigation ponds, created by NCDOT and located near the southern boundary, once again produced good widgeon grass. The pond fringes also continued to produce stands of Bacopa spp., Scirpus spp. and Cyperus spp. Resident Canada geese consume most of the plant growth before migratory birds arrive. Migratory waterfowl use is light to moderate, and appears to be decreasing, primarily due to resident Canada geese. Among waterfowl species observed, gadwall, black duck and green-winged teal were the most common.

4. Croplands

The area previously known as New Field was planted in permanent cover and is no longer managed as cropland. This change is due to the relocation of NC Highway 12 and salt buildup from ocean over-wash. Therefore, there is no cropland on the refuge.

6. Other Habitat

In September, 2003, Hurricane Isabel altered approximately 181 acres of dune and vegetated barrier island habitat to over-wash fan. Restoration of the dune line to protect NC Highway 12 resulted in an over-wash footprint without vegetation. Some of these areas recovered quickly into wetland and dune plant communities, although vegetation is sparser than that which would occur in an undisturbed state. Other areas have remained as wind-blown sand, largely devoid of vegetation. Depending upon location, there will be various successional stages, ranging from bare over-wash sand to maritime grassland/shrubs for several years to come. In many areas, the reconstructed dunes have been severely eroded. Because of the nature of barrier ecosystems, and due to the effects of rising sea level, beach and dune habitat types can be expected to continuously shift along a habitat quality gradient. These successional changes continued throughout 2007, to the point that the "scars" from Hurricane Isabel are becoming less visible.

9. Fire Management

In 2007, prescribed burns were held on Pea Island and the Pea Island burn plan was updated. See Section F-9 of the Alligator River NWR narrative for details.

Firefighters discuss their next move during a prescribed burn at Pea Island NWR
CW

10. Pest Control

Phragmites (*Phragmites australis)* continues to be a problem on Pea Island NWR. In 2005, fifty-two acres of Phragmites were found on the refuge. From July 20th to August 9th, 46.8 acres of phragmites were treated on Pea Island NWR with ground applications from Mackay Island NWR's Marsh Master. Every known phragmites stand, from the New Inlet area north to Oregon Inlet, was treated. No aerial application was performed in 2007, due to the inability to secure a contract for application. This work will continue in 2008, and plans include spraying the southern end of the refuge.

The refuge received a Volunteers and Invasives Grant totaling $2,600 in 2007. The grant was awarded for work on Pea Island NWR. This money was used to purchase herbicide and safety equipment for volunteers and support volunteers who mapped phragmites and assisted with the logistics of herbicide application. Volunteers will be used in 2008 to continue mapping areas with phragmites, to perform surveys of past control sites to determine efficacy, and to assist with the logistics of herbicide applications.

Volunteers also created a poster for the refuge Visitor Center with information about phragmites, its effect on the refuge and what we are doing to control its spread. The poster will hang in the Visitor Center in 2008.

FT Van Druten applied for a Pulling Together Initiative grant, through the National Fish and Wildlife Foundation, to treat phragmites on federal, state and private lands in northeastern North Carolina and southeastern Virginia. This grant pulls together seven national wildlife refuges, one national seashore, one state park, one state DOT, one electric cooperative, one city

government and various private landholders. We should find out whether the grant application was successful in May of 2008.

Herbicide was ordered in 2007. See Alligator River NWR Section F-10 for more information.

G. WILDLIFE

1. Wildlife Diversity

Pea Island has a high natural diversity of habitat types. Habitat management practices, such as prescribed burning, moist soil management, brush removal and mowing serve to enhance habitat quality and wildlife diversity. Pea Island provided habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks and crustaceans during 2007. This diversity was especially evident in birds, and more than 365 species of birds have been identified in the area.

2. Endangered and Threatened Species

a. Federally Listed and Endangered Species

Piping plover (Threatened): The Atlantic coast population of piping plover, *Charadrius melodus,* was listed as a threatened species under the Endangered Species Act in January, 1986. In 2007, there were no piping plover nests on the north end of the refuge. Although one bird was observed regularly in early spring, no nests were observed. Based upon refuge surveys, a range of one to six plovers were consistently observed during migration or wintering in the vicinity of Oregon Inlet and on the north end of the refuge. However, habitat behind the Terminal Groin has undergone succession due to wind and water-borne sand, and it is no longer a suitable nesting and foraging habitat.

Atlantic loggerhead sea turtle (Threatened): Pea Island has an average of 10-12 nests per year. The 1994 nesting season had a record high of 35 nests and 41 false crawls. The 2007 nesting season resulted in 14 sea turtle nests (13 loggerhead nests and one green nest) and 17 false crawls.

Pea Island has a severe beach erosion problem, resulting in a narrow beach and frequent over-wash. In 1994, refuge personnel determined that the best management strategy to optimize survival of turtle hatchlings was to move nests to a turtle safe-zone. Subsequent to that decision, guidelines specific to coastal processes and conditions at the refuge were developed to facilitate the appropriate relocation of turtle nests. To assist with application of the nest relocation guidelines, new maps were created to show areas of unfavorable coastal process conditions, or dredge material disposal activity. In 2007, six nests had to be relocated to the turtle safe-zone at the widest stretch of beach. These nests failed to meet the conditions necessary to have a reasonable probability of success during the incubation period, however, all 14 nests hatched successfully. Hatch rates ranged from 98.8 % to 58.2%. The nest with the lowest hatch rate contained a high occurrence of infertile eggs. Altogether, 1390 hatchlings entered the ocean as a result of many hours of effort by

volunteers and staff.

Lights cause sea turtles to become disoriented and wander into dangerous areas. So, Volunteer Ron Marchand purchased special infrared photographic equipment to capture the infamous "turtle boil." RM

Stranded turtles washed up on Pea Island's beaches in 2007 at a below-average rate of nine for the year. Most of the turtles were already moderately decomposed when found on the beach. The usual missing flippers, cracked skulls, puncture wounds and lacerations were observed. Measurements were collected and recorded and tissue samples were taken from all stranded turtles. These were sent to the North Carolina Sea Turtle Coordinator at the North Carolina Wildlife Resources Commission. One 269-pound loggerhead sea turtle was found live-stranded in August and was taken to a local veterinarian. Subsequently, the turtle was rehabilitated at the N.E.S.T. facility and later released with a clean bill of health. An injured loggerhead hatchling was found live-stranded in September and taken to a local veterinarian/N.E.S.T. facility. In December, a green sea turtle was found live-stranded and taken to a local veterinarian/N.E.S.T. facility.

Green sea turtles (Threatened): The first green sea turtle (*Chelonia mydas)* known to nest on Pea Island was in 1993. One of the nests on the refuge during the 2007 nesting season was identified as a green sea turtle nest.

b. State Listed Endangered and/or Threatened Species

Among other species observed on the refuge and not federally listed, the State of North Carolina lists some as endangered, threatened, special concern or significantly rare. Although the refuge is not managed for all of these species, present practices do provide benefits for many of them. Species occurring on the state list and refuge are:

Least tern (Significantly Rare): Historically, least terns have nested 2.0 miles north, 0.5 miles south, and 5.5 miles south of the Pea Island NWR Headquarters. During 2007, colonies were observed at the Oregon Inlet terminal groin, approximately 3.7 miles north of refuge headquarters, approximately 1.9 miles north of refuge headquarters, approximately 1.3 miles north of refuge headquarters, approximately 0.6 miles north of refuge headquarters, approximately 3 miles south of refuge headquarters, and approximately 5.5 miles south of headquarters. Least tern numbers peaked at 429 in late May.

Caspian tern (Significantly Rare): This species is not very common on the refuge. Its numbers peak in the fall, usually during October. The peak number during 2007 was 50 and the peak occurred in September. Nesting on the refuge has not been documented.

Common tern (Significantly Rare): Common terns are found nesting with other terns. During 2007, two nests were observed at the least tern colony, 1.0 miles north of refuge headquarters. Common tern numbers peaked in July at 73.

Gull-billed tern (Significantly Rare): Gull-billed terns occur in low numbers. During 2007, nesting birds were not observed on the refuge. Gull-billed tern numbers peaked in May at five.

Black skimmer (Significantly Rare): Black skimmers are observed along the oceanfront, sound and impoundments on the refuge. During 2007, nesting birds were observed at the Oregon Inlet terminal groin and in the least tern closure 1.0 miles north of refuge headquarters. Black skimmer numbers peaked in September at 428.

Little blue heron (Significantly Rare): The little blue heron is found mostly around the three impoundments or marsh edges. Numbers peaked at 38 in September. Nesting on the refuge was not documented.

Snowy egret (Significantly Rare): The snowy egret is found mostly around the three impoundments or marsh edges. Numbers peaked at 108 in September. Nesting on the refuge was not documented.

Tri-colored heron (Significantly Rare): The tri-colored heron is found mostly around the three impoundments or marsh edges. Numbers peaked at 53 in August. Nesting on the refuge was not documented.

Black-necked stilt (Significantly Rare): The black-necked stilt is found mostly around the three impoundments. Numbers peaked at 14 in August. One nest was documented in the New Field impoundment.

Peregrine falcon (Endangered): The Arctic peregrine, *Falco peregrinus tundrius,* can be observed on the refuge with some regularity during migratory periods. Nesting does not occur on the refuge.

3. Waterfowl

Wintering waterfowl surveys were conducted from September through March and results from this year's surveys are provided in Table ***G-3-1***. Total waterfowl numbers peaked at 32,346 in mid-December. Snow geese peaked in late November, while tundra swan numbers peaked in early January. Canada geese are believed to be only resident birds. Use days decreased from the ten-year average among all species except the tundra swan, the American widgeon, the northern pintail, and the ring-neck, redhead, scaup, bufflehead and ruddy ducks. Compared to the 2005-06 wintering period, the snow goose, Canada goose, bufflehead, scoter, and the green-wing and blue-wing teal, showed declines in use days. All other species showed increases. There were notable increases among the redhead and scaup. Figures ***G-3-1*** and ***G-3-2*** illustrate seasonal shifts in numbers for each species.

Anecdotal brood counts were conducted in conjunction with shorebird surveys, but accurate records were not kept. A few black duck and gadwall broods were observed in all three impoundments. Although not supportable with data, gadwall nesting appears to be increasing on the refuge.

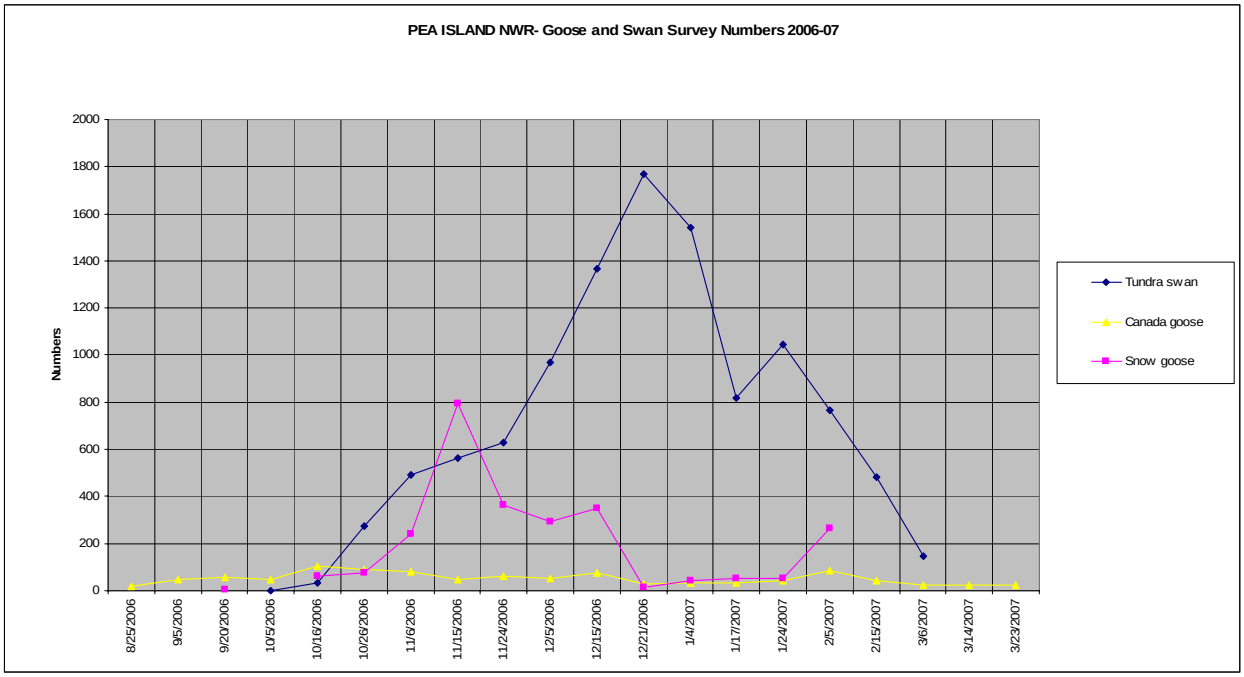
Other interesting observations not reflected in the table include Eurasian widgeon and the return of canvasbacks after their absence last year. Few Eurasian widgeon and canvasback sightings occur annually on the refuge.

Table ***G-3-1:*** Composition of wintering waterfowl at Pea Island NWR during the 2006-2007 survey period in Dare County, North Carolina.

SPECIES	PEAK PERIOD	PEAK #	# USE DAYS 2006-07	% TOTAL USE DAYS	USE DAYS % diff from 10 yr avg
Tundra swan	Dec	1768	117564	4.6	78
Snow goose	Nov	794	30685	1.2	-68
Canada goose	Oct	105	11021	0.4	-75
Mallard	Dec	78	5973	0.2	-39
Black duck	Nov	1006	103195	4.0	-31
Gadwall	Dec	3549	178365	6.9	-11
American widgeon	Dec	6927	272327	10.5	45
Northern pintail	Oct	6751	468307	18.1	54
Green-winged teal	Oct	594	41178	1.6	-67
Blue-winged teal	Sept	108	2519	0.1	-83
Northern shoveler	Dec	334	24751	1.0	-74
Wood duck	N/A	0	0	0.0	-100
Ring-necked duck	Dec	48	2082	0.1	127
Redhead	Jan	9180	269356	10.4	687
Canvasback	Nov	18	548	0.0	-61
Scaup	Jan	4532	139120	5.4	457
Bufflehead	Dec	578	30799	1.2	102
Ruddy duck	Dec	937	69565	2.7	187
Mergansers	Nov	326	19624	0.8	-12
Goldeneye	N/A	0	0	0.0	-100
Scoter	Oct	1	15	0.0	-94
Coot	Dec	12807	758749	29.4	-100
Unknown	Dec	601	37799	1.5	-46

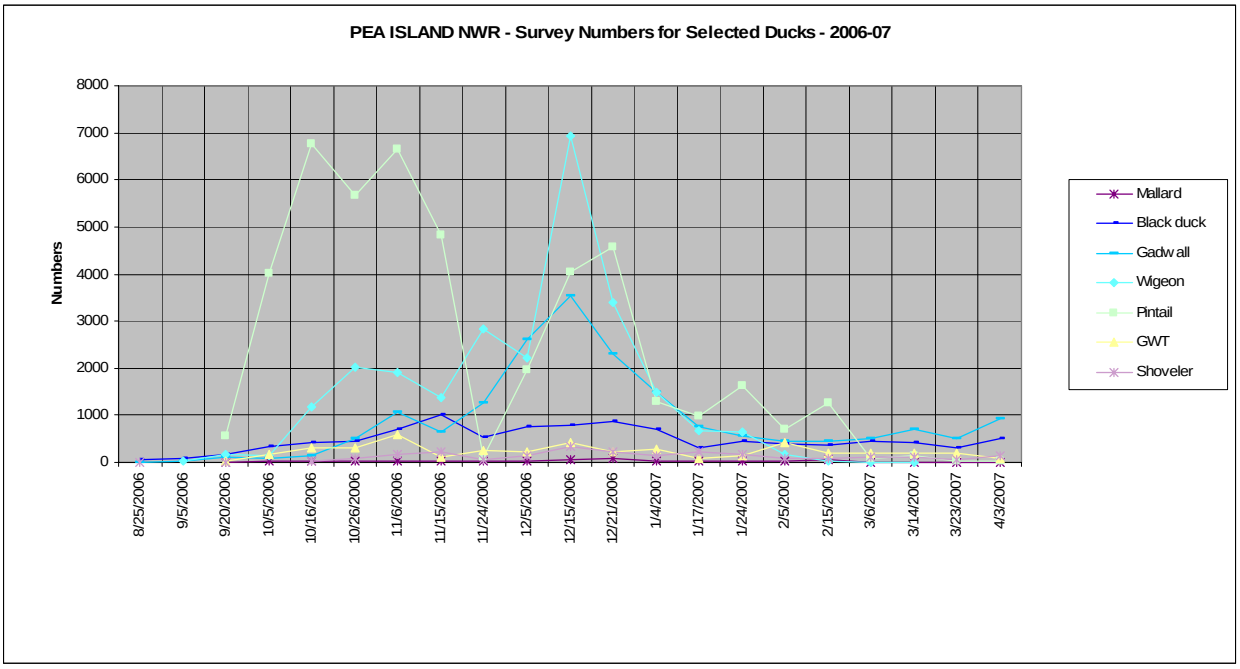
Figure ***G-3-1*** illustrates changes in the numbers of geese and tundra swan over the wintering period. Canada geese represented in this database are believed to be resident birds, involved only with local movements, and not migrant birds. There appear to be no Atlantic Province migratory Canada geese using the refuge and few, if any, using waters within the Proclamation Boundary in the Pamlico Sound.

Figure ***G-3-1:*** Number of geese and swans counted during the 2006-07 wintering period surveys at Pea Island National Wildlife Refuge in Dare County, North Carolina.



Although not as distinct as in years with higher numbers of wintering ducks, Figure ***G-3-2*** suggests that duck numbers began increasing by late September and remained relatively high until mid-to-late February. The Northern pintail and, to a lesser extent the American widgeon, appear to have arrived, moved around to other wintering sites and then returned to the refuge. It is not unusual for waterfowl to peak in early to mid-December, drop to relatively low numbers and then peak at a lower level from mid-to-late January. Dispersal to other suitable, natural or well-managed habitat within the wintering area is the most logical explanation for such observations.

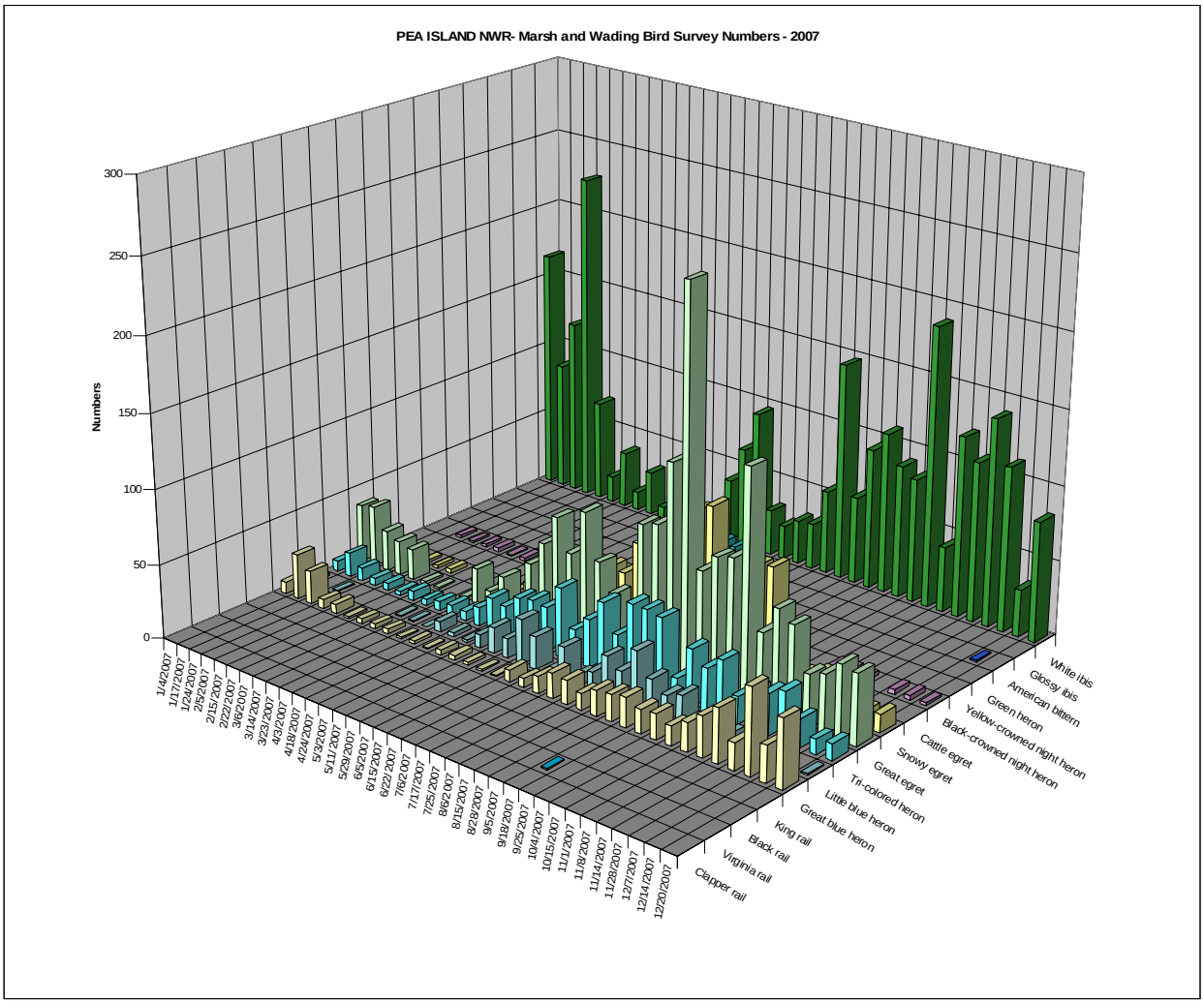
Figure ***G-3-2:*** Number of selected duck species counted in wintering surveys during the 2006-07 wintering period at Pea Island National Wildlife Refuge in Dare County, North Carolina.



4. Marsh, Water and Wading Birds

Marsh and wading birds were counted three times per month during regular bird surveys. We do not conduct surveys specifically for marsh birds, but those species are recorded as they are encountered. Overall numbers increased to a peak of 567 in early September. Figure ***G-4-1*** provides some insight into the time of arrival by species, as well as some indicator of relative abundance. Commonly occurring species include great and snowy egrets, great blue heron, little blue heron, green heron, tri-colored heron, black-crowned night heron, yellow-crowned night heron, white ibis, double-crested cormorants and American bittern. Clapper, king, black and yellow rails were not observed during the diurnal surveys. One Virginia rail was observed on the surveys. Rails are present on the refuge, but survey techniques are not conducive for detection.

Figure ***G-4-1:*** Number of marsh and wading bird species counted during surveys conducted three times per month in 2007 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



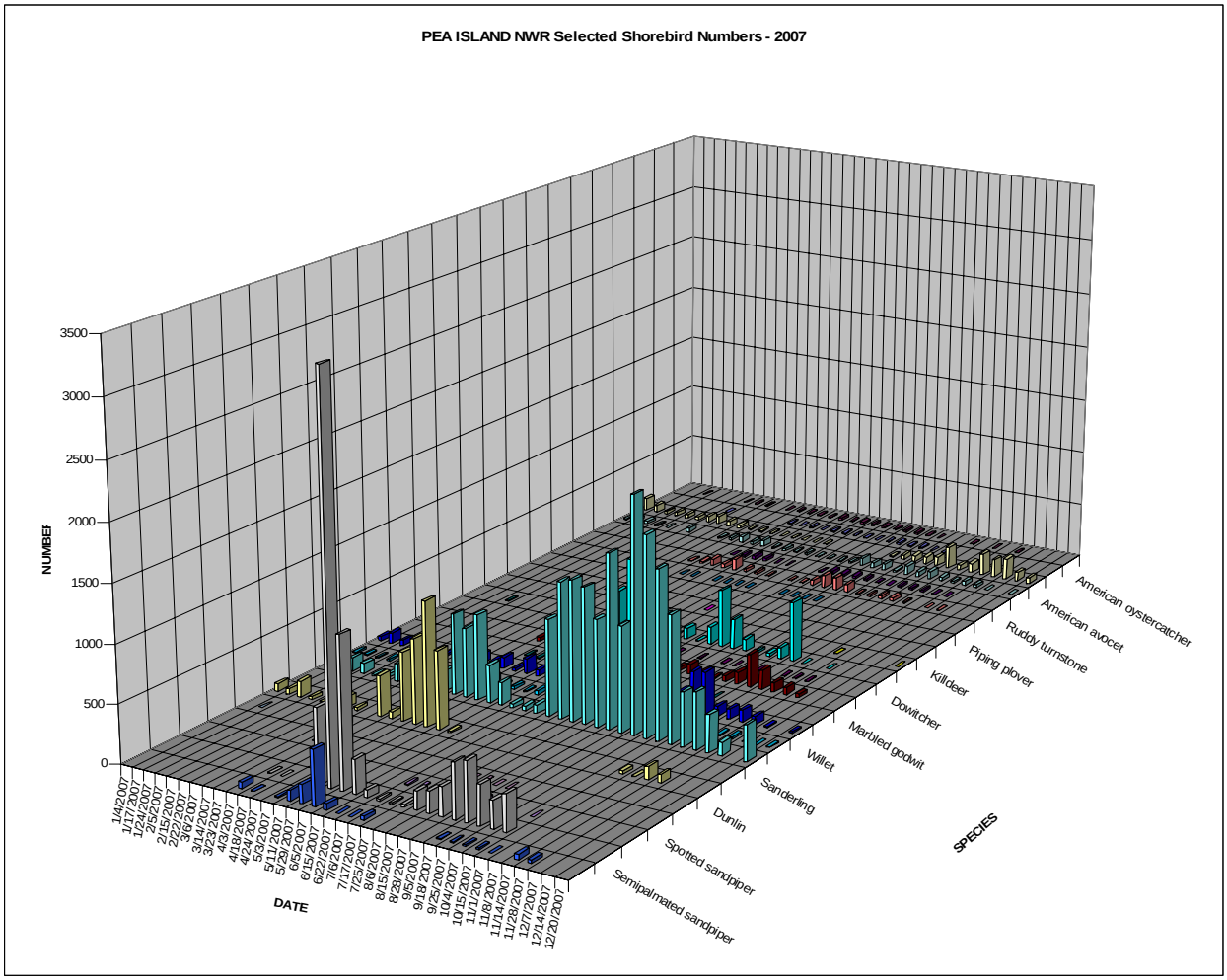
Brown pelican numbers have continued to increase over the past few years as the species has expanded northward into coastal North Carolina and Virginia. These birds were previously listed as a threatened species in North Carolina and were rarely observed. A group of about 47 white pelicans was observed on the refuge from December through early February. The large, seasonal concentration of double-crested cormorants is indicative of the value of the Oregon Inlet and vicinity as a migration staging area.

5. <u>Shorebirds, Gulls, Terns and Allied Species</u>

Shorebird surveys were conducted three times per month during the year. Shorebird numbers peaked at approximately 8,090 in late May, about 4,490 in mid September, and 4,626 in mid-October. The mid-May count reflects the effects of spring migration. Counts completed during the period from late July through late November illustrate less definition in the fall migratory period. Some of the commonly occurring species include the semi-palmated and western

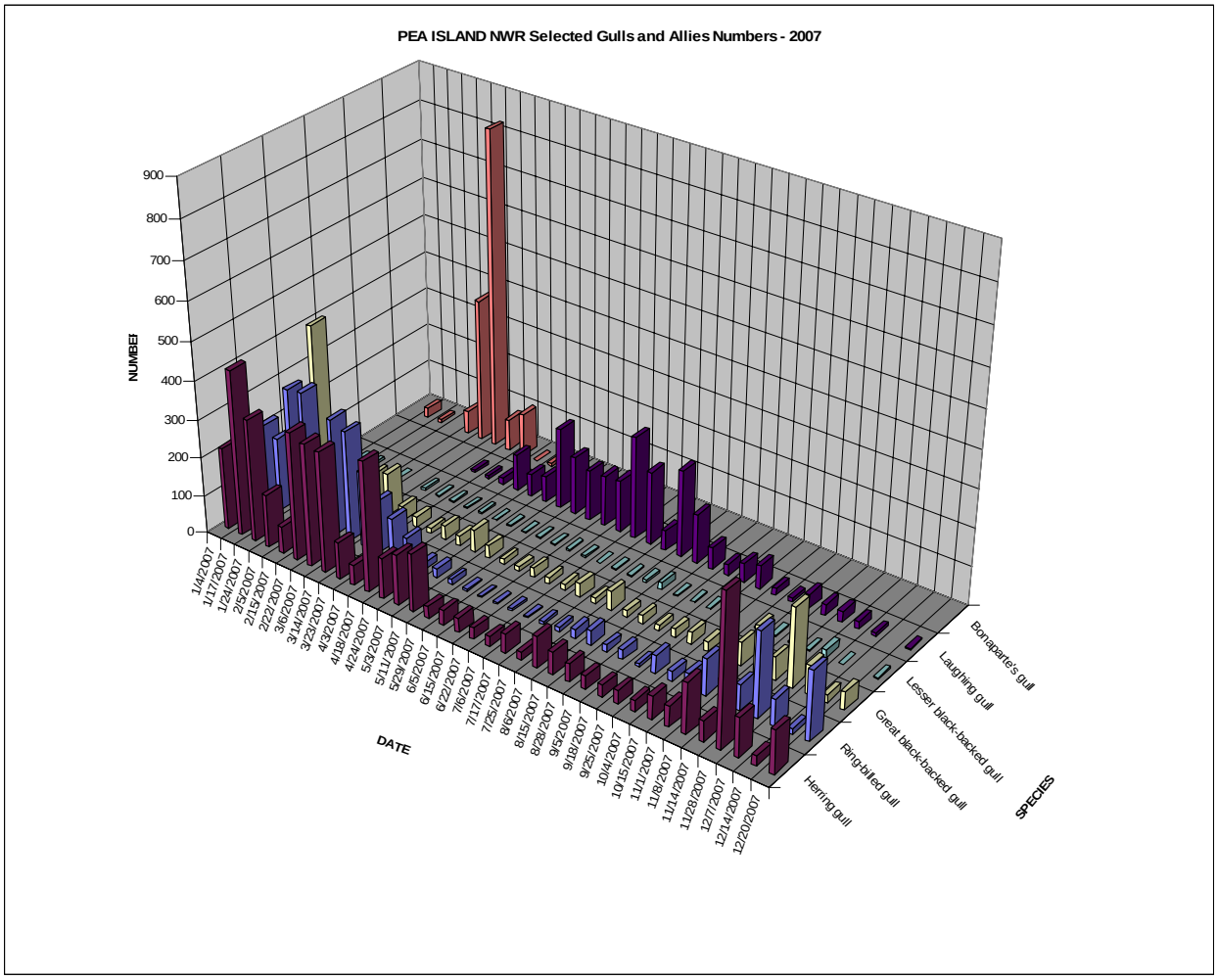
sandpipers, semi-palmated plover, sanderling, whimbrel, American oystercatcher, black skimmer, various tern and gull species, the dowitcher, marbled godwit, willet, dunlin, black-bellied plover, ruddy turnstone, American avocet, red knot, greater and lesser yellowlegs and the black skimmer. Figure ***G-5-1*** provides some insight on the numeric and seasonal distribution by species.

Figure ***G-5-1:*** Number of shorebird species counted during surveys conducted three times per month in 2007 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



Peak numbers and dates for gulls varied by species. Based upon individual surveys, the highest number of herring gulls occurred in January, at 433, along with great black-backed gulls at 430. The highest number of ring-billed gulls occurred in February, at 344. The highest number of laughing gulls occurred in a July survey, at 268. These species are of concern because of their predation on colonial nesting shorebirds. Figure ***G-5-2*** provides some insight as to the numeric and seasonal distribution by species.

Figure ***G-5-2:*** Number of gulls by species counted during surveys conducted three times per month in 2007 at Pea Island National Wildlife Refuge in Dare County, North Carolina.

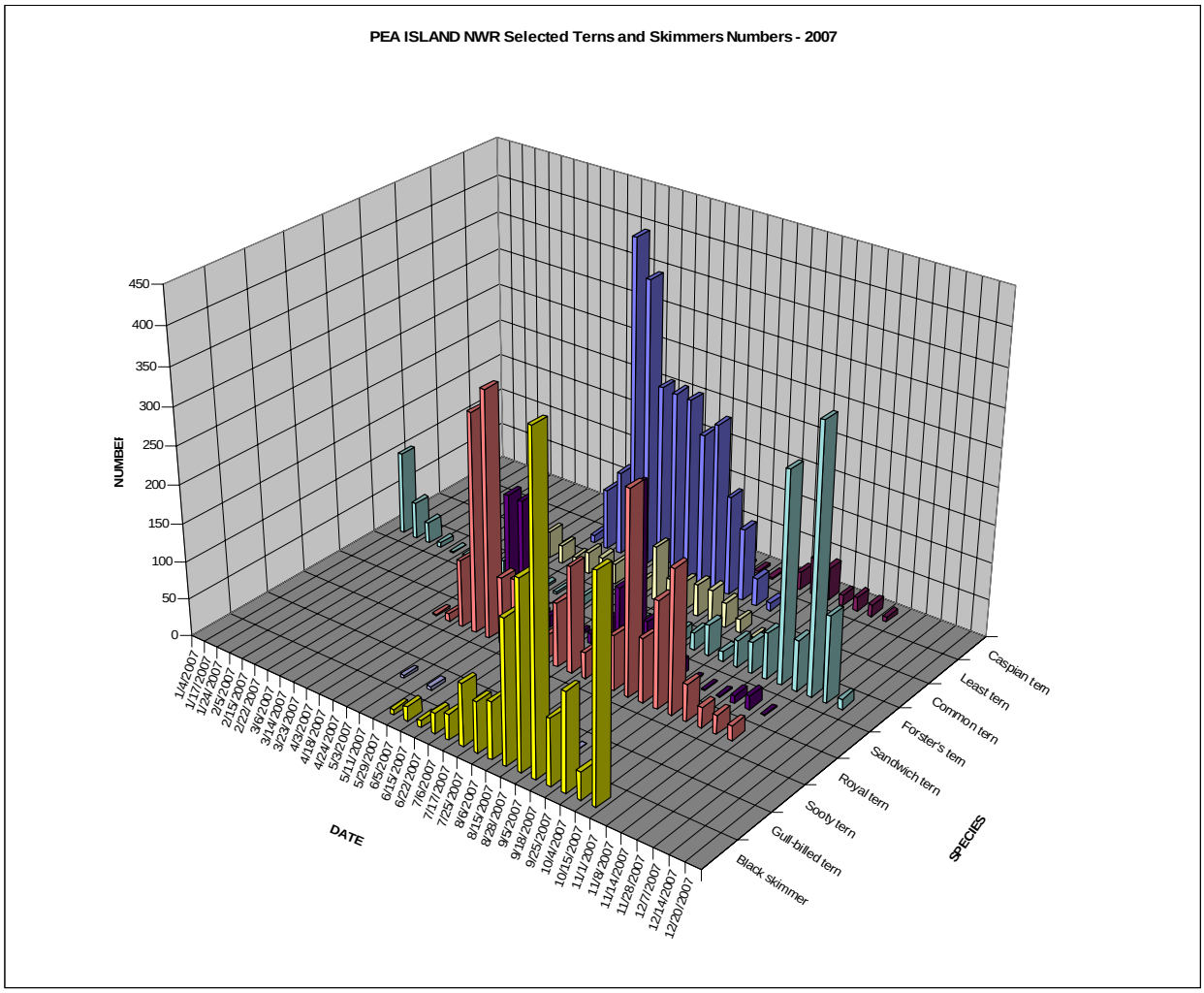


Colonies of nesting black skimmers and least terns were observed behind the terminal groin at Oregon Inlet and one mile north of headquarters. Nesting by least terns was also observed on the beach in four locations between the North Pond kiosk and the southern boundary of the refuge. There were six American oystercatcher nests documented on the beach, with a total of 15 eggs laid. The fate of many of the oystercatcher chicks is unknown, however, observations indicated that at least four chicks were fledged.

Shorebirds, like this American Oystercatcher, migrate to Pea Island National Wildlife Refuge
JL

All areas were posted and closed to public access and a string with flagging was placed around the perimeter of each posted area. Perimeters of the closed areas were recorded with a GPS unit and transferred to refuge maps. The primary purpose for mapping the closed-area perimeters was to determine the total area of closure, as well as the linear distance of the beach closure. Figure ***G-5-3*** provides some insight as to the numeric and seasonal distribution by species.

Figure ***G-5-3:*** Number of skimmer and tern species counted during surveys conducted three times per month in 2007 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



A comparative report of shorebird, marsh bird and water bird use-days within and between seasons was not undertaken to any great extent on the refuge prior to the 2005 narrative. Although limitations to the applications of the data are recognized, it is a useful method for monitoring change in habitat use. Table ***G-5-4*** provides a summary of the use-day analysis done at the end of 2007. The long-term average is derived from a ten-year database. Data based upon low observations, in the column presenting the percentage of total use-days, has been arbitrarily assigned a value of 0.01.

Table *G-5-4*: Composition of Shorebirds, Pea Island NWR 2007

SPECIES	PEAK PERIOD	Peak #	# USE DAYS 2007	% TOTAL USE DAYS 2007	USE DAYS % diff from long-term average
Water Birds & Sea Birds					
Pied-billed grebe	Dec	173	17490	1.9	78
Common loon	Jan	3	154	0.0	-4
Double-crested cormorant	Nov	1100	55593	509	-35
White pelican	Jan	47	1688	0.2	96
Brown pelican	Jan	113	9887	1.1	-42
Northern gannet	Jan	9	547	0.1	-70
Other Water/Sea bird	Oct	6	81	0.0	194
Unknown Water/Sea bird	N/A	0	0	0.0	-100
Marsh and Wading Birds					
Clapper rail	N/A	0	0	0.0	-100
Virginia rail	Sept	1	10	0.0	9
Black rail	N/A	0	0	0.0	N/A
King rail	N/A	0	0	0.0	N/A
Great blue heron	Dec	57	4390	0.5	8
Little blue heron	Sept	38	3308	0.4	-36
Tri-colored heron	Aug	53	8223	0.9	34
Great egret	Sept	256	20140	2.2	46
Snowy egret	Sept	108	10965	1.2	6
Cattle egret	Jun	5	53	0.0	-67
Black-crowned night heron	Jun	6	687	0.1	-5
Yellow-crowned night heron	Jul	1	20	0.0	-86
Green heron	N/A	0	0	0.0	-100
American bittern	Dec	1	7	0.0	-81
Glossy ibis	May	9	389	0.0	-38
White ibis	Feb	226	25409	2.7	76

Other Marsh/Wading Species	N/A	0	0	0.0	-100
Unknown Marsh/Wading Birds	N/A	0	0	0.0	-100
Gulls and Allies					
Herring gull	Jan	433	43382	4.6	22
Ring-billed gull	Feb	344	30893	3.3	-14
Great black-backed gull	Jan	430	20614	2.2	-26
Lesser black-backed gull	Nov	22	1358	0.1	128
Laughing gull	Jul	268	23630	2.5	22
Bonaparte's gull	Mar	835	14776	1.6	777
Other gull species	N/A	0	0	0.0	-100
Unknown gull species	N/A	0	0	0.0	-100
Terns and Skimmers					
Caspian Tern	Sept	50	1976	0.2	30
Least tern	May	429	25694	2.7	8
Common tern	Jul	73	5505	0.6	-63
Forster's tern	Nov	351	14561	1.6	199
Sandwich tern	Aug	230	9440	1.0	31
Royal tern	May	325	23107	2.5	40
Sooty tern	N/A	0	0	0.0	-100
Gull-billed tern	May	5	127	0.0	-92
Black skimmer	Sept	428	18727	2.0	23
Other tern species	Aug	10	379	0.0	-35
Unknown tern/skimmer	Aug	20	1036	0.1	4
Shorebirds					
American oystercatcher	Jun	19	1881	0.2	-4
Black-necked stilt	Aug	14	1021	0.1	-2
American avocet	Oct	200	17504	1.9	4
Black-bellied plover	Sep	82	9248	1.0	32
Ruddy turnstone	May	31	2700	1.0	6
Semi-palmated plover	Aug	113	7770	0.3	-47
Piping plover	Apr	6	214	0.8	-58

Snowy plover	N/A	0	0	0.0	-100
Wilson's plover	N/A	0	0	0.0	-100
Killdeer	Mar	1	21	0.0	-87
Common snipe	Nov	4	39	0.0	141
Dowitcher	May	619	41706	4.5	67
Red knot	May	141	3800	0.4	39
Marbled godwit	Oct	284	11772	1.3	282
Whimbrel	May	9	466	0.0	-46
Willet	Aug	380	50947	5.4	96
Yellowlegs	Sept	184	12619	1.3	-38
Sanderling	Sept	2034	198095	21.2	71
Stilt sandpiper	N/A	0	0	0.0	-100
Dunlin	May	1082	44696	4.8	-38
Purple sandpiper	Mar	47	480	0.1	91
Spotted sandpiper	Sept	4	147	0.0	-56
Least sandpiper	Aug	46	1817	0.2	-88
Semi-palmated sandpiper	May	3402	89198	9.5	-5
Western sandpiper	Jun	475	9157	1.0	12
Other shorebird species	Jun	243	4450	0.5	-26
Unknown shorebirds	May	1479	32300	3.4	58

On Pea Island National Wildlife Refuge, avocets like these may be observed on most winter days. RM

6. Raptors

American bald eagle: Bald eagles, *Haliaetus leucocephalus,* were de-listed during 2007. Bald eagles can sometimes be seen flying over the refuge. There were reports of an occasional bald eagle during 2007. All of these birds were transient, with none remaining in the area more than a few days.

The Carolina Raptor Center operated a raptor banding and hawk watch station in early October, 2007. Mist nets, bow nets and lure birds were used to capture and band peregrine falcons, sharp-shinned hawks and American kestrel. During the hawk-watch, observed species included osprey, bald eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, American kestrel, merlin and peregrine falcon. The Center was issued a Special Use Permit to continue this work in 2007.

7. Other Migratory Birds

The diversity of bird life on Pea Island is so great that it is sometimes referred to as a "birder's paradise". This is especially true when considering the passerine species. Some 115 different species of songbirds are believed to migrate through the refuge. However, little is known about the use of refuge habitat by neo-tropical and other migrant birds. A limited, preliminary survey of passerine bird use in various habitat types was initiated in 2005. Results from this data-collection effort suggest a relatively low avian use in the habitat types at the refuge. With decreasing budgets and a shrinking staff size, this survey was discontinued in 2007.

8. Game Mammals

Cottontail and marsh rabbits are fairly common on the refuge. Declines in numbers from a few years ago seem to have reversed Presence of scat, tracks and road kills indicate the continued presence of limited numbers of foxes and opossums. Based on anecdotal observations, it appears that the raccoon population increased rapidly, and may now be in a decline due to diseases such as mange, distemper, and possibly rabies. The presence of these species, as well as feral house cats, may be one of the causes for the decline in pheasant populations.

Deer tracks have frequently been observed throughout the refuge, and staff members have spotted both does and bucks. Although no formal surveys are being done, increased observations of deer, the number of tracks and the increasing number of road-killed deer suggest that the size of the herd is growing, and may need to be managed.

River otters have been observed in the impoundments. Muskrat, nutria and mink are also present on the refuge.

9. Marine Mammals

During 2007, eight stranded marine mammals were found on the refuge beach. Staff from the National Marine Fisheries were contacted, and they performed required necropsies and data collection. The eight stranded mammals included bottle-nosed dolphin (2); harbor porpoise (1); Atlantic white-sided dolphin (1); pilot whale (2); striped dolphin (1); and a marine mammal decomposed to the point that species-type could not be identified (1).

10. Other Resident Wildlife

In past years, ring-necked pheasants were occasionally observed in salt marsh, brush land, dunes, and in the refuge grain field. This population descended from birds introduced in the 1920's and 1930's, prior to the area's designation as a refuge. Sightings have decreased in recent years. Four sightings were reported during 2005. However, it appears that the population has decreased to very low numbers.

The resident Canada goose population is becoming a significant problem with regard to maintaining food stock and production for migratory waterfowl. During the summer months, approximately 100-200 resident geese constantly foraged on plant material in the impoundments. By the time the migratory birds arrived, primary production in the three impoundments had been largely consumed by the resident geese. Efforts to manage the geese focused on oiling and addling eggs in 2007. No nests were affected by this effort in 2007, mostly due to staffing limitations.

14. Scientific Collections

Tissue samples were collected from stranded sea turtles and given to the North Carolina Sea Turtle Coordinator. Tissue samples were collected from stranded marine mammals by the Marine Mammal Stranding Network Coordinator at the National Marine Fisheries Service.

Beach sampling was done on a regular basis. This is described in greater detail in Section D-5.

Biological Program staff assisted the NC Wildlife Resources Commission with the collection of Canada goose feathers in June. The purpose of this study was to develop a genetic baseline for resident geese that could be compared to migrant birds from various ranges of the breeding grounds. Three broods were caught, feather samples were taken, and all birds were released.

15. Animal Control

Feral cats continue to be found on the refuge. Four feral cats were trapped using Have-a-Heart traps – three at Oregon Inlet and one near headquarters. The cats were taken to the local animal shelter. Mink, raccoon, cat and canid tracks were observed along the terminal groin at Oregon Inlet during the summer. A mute swan nest was located in the New Field impoundment. In April, all eggs were addled and oiled. Mute swans did not reproduce on the refuge during the 2007 nesting season. Non-native and other problem animals will be removed in the future.

16. Marking and Banding

Every summer, refuge volunteers and certain staff members accompany John Weske and Micou Brown to band brown pelicans, royal terns, Caspian terns and sandwich terns on spoil islands located west of Oregon Inlet. This year, 675 brown pelican chicks, 922 royal tern chicks and 25 sandwich tern chicks were banded. None of this banding occurred on the refuge.

H. PUBLIC USE

1. General

Based on the NPS vehicle counter at Bodie Island, estimated visitation to Pea Island NWR during 2007 was 1,500,000 (calculated from multiplying the vehicles logged on the counter with an estimate of two passengers per vehicle). Volunteers from the Coastal Wildlife Refuge Society continue to staff the Visitor Center, which is open daily through the spring, summer and fall months. It is open weekends during the winter. The Visitor Center is the perfect hub for the interpretive and educational programs on this refuge.

2. Outdoor Classrooms - Students

The refuge saw a slight decrease in the number of school visits in 2007. Refuge staff were able to accommodate every group that requested a refuge-led program. They experienced the greatest need for environmental education programs during the months of May and October. Overall, approximately 12 schools and a total of 751 students participated in environmental education programs on-site at Pea Island. Staff also provided off-site programs to 420 students in 2007.

Many teachers also opt to bring their students to the refuge for hands-on experiences.

3. Outdoor Classrooms – Teachers

There is currently no demand for teacher training on Pea Island NWR. Alligator River NWR and Pea Island NWR are located in an area rich in conservation education/interpretation agencies. Therefore, these refuges do not receive the requests common to other stations, which may often be the sole sources available for information and/or education. The North Carolina Aquarium, Jockey's Ridge State Park, Nags Head, Woods Ecological Preserve and Cape Hatteras National Seashore offer environmental education and teacher training activities. During 2007, refuge staff worked cooperatively with other agencies to offer training and promote outreach through local venues.

4. Interpretive Foot Trails

North Pond Wildlife Trail is universally accessible. It offers seven permanently-mounted spotting scopes and five major observation structures, terminating with a 25-foot observation tower. From the tower, visitors have a view of the ocean, the sound and two refuge impoundments. Approximately 650,000 visitors utilized North Pond Trail during 2007.

Another trail, the Salt Flats Wildlife Trail, is located at the northern end of North Pond. This trail is approximately one-eighth of a mile long. It is fully accessible and offers visitors an opportunity to observe and photograph wildlife.

6. Interpretive Exhibits/Demonstrations

An interpretive kiosk is located at the Salt Flats parking area. Two more kiosks are located at the north and south ends of the refuge, providing valuable information for visitors on a 24-hour basis. The Salt Flats kiosk features interpretive panels on shorebird migration and fire management, as well as a refuge orientation panel. The South Kiosk has an orientation panel, Refuge System panel and wintering waterfowl interpretive panel. It also has interpretive panels on barrier beach ecology, geology and endangered species. The North Kiosk has a refuge orientation panel, a Refuge System panel and a wintering waterfowl interpretive panel.

Panels located on the front porch of the Visitor Center are also available around-the-clock.

7. Other Interpretive Programs

The refuge sponsored the eleventh annual Wings Over Water festival in 2007. See section H-18 for details.

Refuge outreach staff presented off-site programs to local organizations and schools. These included a Fish Printing program at Festival Park and a Watersheds program at Cape Hatteras Secondary School.

The Junior Friends of the Refuge Club, in partnership with First Flight Middle School, continued to be strong in 2007. This club of about 20 members met monthly at the middle school, planned weekend trips to the refuge, and constructed a habitat of native vegetation in the courtyard of the school grounds. WIS Chapman presented five programs for the club, and these were also conducted at the school

Continuing in 2007, WIS Chapman cultivated an outreach relationship with the Outer Banks Beach Club. Beginning in May, she spoke on Monday mornings to weekly time-share residents about the Pea Island and Alligator River Refuges, informing listeners about the interpretive programs offered at each refuge. She addressed approximately 630 people at 11 meetings.

Most regularly-scheduled, 2007 on-site interpretive programs were conducted by refuge volunteers and interns at Pea Island NWR. Friday bird walks were conducted year-round. Guided Pamlico Sound canoe tours (three hours) and family canoe tours (two hours) were offered once each week during the spring and fall months, and twice each week during the summer months. Also during the summer, one Turtle Talk, one Soundside Discovery and one Raptor Rapture program was conducted each week. Refuge staff continued posting daily flyers on the visitor center door to promote the interpretive programs, and these postings increased interest and participation.

Programs conducted on the refuge were presented to 2,894 visitors. Off-refuge programs were conducted for 2,055 participants.

Pea Island NWR
Regularly Scheduled Interpretative/Educational Programs (On-Refuge)

Program	# of Participants	# of Programs
Bird Walk	880	69
Family Canoe Tour	338	26
PI Canoe Tour	113	20
Raptor Rapture	36	8
Shifting Sands	8	3
Soundside Discovery	545	17
Turtle Talk	914	22
Wildlife on the Outer Banks	60	1

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island NWR throughout 2007. Bluefish, striped bass, red drum (often fished at night), spot, pompano, croaker and trout were the fish most often caught. Nighttime fishing permits are distributed at the refuge visitor center and local fishing and tackle stores from September 15 through May 31.

Parking for the popular Bonner Bridge catwalk is located on the refuge. This is probably the most heavily fished area on the refuge. A total of 51,500 fishing-related visits were logged in 2007. The annual Crabbing/Fishing Rodeo was held the second Saturday in June, drawing approximately 1,000 participants.

Kory and Mya Erpelding, pictured above, had a great time at the 2007 Crabbing Rodeo
FWS

11. Wildlife Observation

Due to the traversal of NC Highway 12 through Pea Island NWR, it is difficult for a traveler to pass without observing wildlife. On most days throughout the year, the quality of observation is quite high. During fall and winter, greater snow geese frequently feed on the road shoulders.

During spring and summer, great and snowy egrets replace snow geese as the most easily observed wildlife. Various species of raptors utilize the dunes, power line poles and sign posts for resting and hunting.

Refuge trails and other access points are well-situated to make wildlife observation (on foot) easy and enjoyable. The needs of the public were seriously and diligently considered when the North Pond area was selected as a focal point for public use, and the areas around the other two impoundments were closed. There are many refuge visitors who support this policy.

2007 Wildlife Observation Visits:

Foot	650,000
Boat	7,800

12. Other Wildlife-Oriented Recreation

The photo-blind, installed during 1995, continued to be utilized fully during 2007. An estimated 1,500 visitors used the blind.

15. Off-Road Vehicling

The use of ORV's on Pea Island NWR is restricted to NC Highway 12. Illegal ORV traffic continues to plague the refuge, and this is probably due to the rapid erosion of the beach and the repeated ocean over-wash along NC 12 as it traverses Pea Island. As long as there is any route by which vehicles can reach the beach, there are likely to be problems with ORV traffic there.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island NWR is associated with the "beach scene", non-wildlife-related recreational activities continue to be enjoyed on the refuge. Swimming, picnicking, surfing and sunbathing are popular summer activities. The refuge provides no facilities and few services for these activities.

17. Law Enforcement

Due to a Memorandum of Understanding (MOU) with Cape Hatteras National Seashore, the National Park Service (NPS) has the primary responsibility for non-wildlife-related public use on Pea Island NWR. For this reason, NPS law enforcement is maintained regularly, though not constantly, on the refuge. The most common law enforcement problems are public nudity, littering and dogs off-the-leash.

There are minor poaching problems at Pea Island NWR. Occasionally, cars will stop and shots will be fired at waterfowl from the road. Poachers sometimes slip in from Pamlico Sound to quickly shoot as many waterfowl as they can, and then speed away. Some illegal hunting may occur within the refuge boundaries in the Pamlico Sound. These types of violations are difficult to detect and the violators are difficult to apprehend. For details on the law enforcement program, see section H-17 of the Alligator River Annual Narrative Report.

18. Cooperating Associations

The Coastal Wildlife Refuge Society (CWRS) is the primary cooperating association and friends group for both Alligator River and Pea Island National Wildlife Refuges. The Society also provides guidance and support for other refuges in North Carolina and serves as a mentoring organization for the fledgling friends groups at Mackay Island and Pocosin Lakes.

CWRS operates a popular book store/gift shop from the Pea Island Visitor Center. This retail sales unit is the organization’s primary source of revenue. In FY 2007, the sales unit grossed $141,693. In addition, the majority of its $7,000+ donations were received via donation boxes on Pea Island.

During 2007, the refuges and CWRS continued to play a major leadership role in the annual Wings Over Water (WOW) event. CWRS continued to handle the funds for the program. A total of 267 people registered for the 867 spaces available on trips conducted during the event. Participation in these trips generated a total of $22,561 in registration fees. 2007 was the second year in which the Outer Banks Sentinel partnered by publishing the registration booklet; hence, this was the second year that WOW finished in the "black".

For more details about the Coastal Wildlife Refuge Society's activities, please see section H-18 of the Alligator River Annual Narrative Report.

During Wings Over Water, more than 180 species of birds were documented. Among the more rare birds was this Snow Bunting, seen near North Pond on Pea Island National Wildlife Refuge.
RM

I. EQUIPMENT AND FACILITIES

3. Major Maintenance
   - Made mechanical repairs to North Pond and New Field pump engines.

4. Equipment Utilization and Replacement
   - Removed excess sand from the north entrance of North Pond Road (Extensive amounts of blowing sand from storm events had accumulated, closing off vehicular access at the entrance of the impoundment perimeter road).
   - Mowed Pea Island impoundment dikes / roads and fire breaks.
   - Pumped / maintained North Pond and New Field impoundments to target levels.
   - Pumped into South Pond with (portable) MWI pump to maintain impoundment water levels.

6. Computer Systems

A laptop was secured from the Migratory Birds Office for Abbey Reibel.

Pea Island suffered a significant loss of Internet connectivity due to changes made by the State of North Carolina. Currently, the refuge gains access to the Internet through a high-speed connection which the state provides for the GPS base station it maintains at the Pea Island office. Additional hardware was ordered and installed with the assistance of Buddy Jones. By the end of December, we were able to get connectivity restored to the office.

8. Other

- Maintenance staff assisted with the coordination of Pea Island volunteer work projects.
- The Refuge Staff participated in the Regional Environmental Safety audit.

J. OTHER ITEMS

1. Cooperative Programs

The refuge continues to work with the Department of Geology at East Carolina University on a regional project designed to uncover more information about the origin and evolution of the Outer Banks barrier island system. Information gained through this research will be used to model future conditions on the barrier islands as sea levels continue to rise.

4. Credits

This Annual Narrative Report was a joint effort by the refuge staff, with compilation by OA Adam Fauth and editing by volunteer Tess Critzer and VSM Bonnie Strawser.

Photo Credits:

CW	Cory Waters
FWS	Fish & Wildlife Service
JL	Jeff Lewis
RM	Ron Marchand